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NEW YORK SHOW NUMBER

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MOTORAGE





New York American Shows

New York, Jan. 13—If the stupendous and magnificent motor car exhibitions, which opened tonight at the time-honored Madison Square garden and the new armory of the Sixty-ninth regiment hard-by, and the tens of thousands of enthusiasts, who jammed both buildings to suffocation and paraded in regiments through Twenty-sixth street from one to the other, do not mark the zenith of the growth of the industry and the popularity of the twentieth century's new locomotion, who will tell us what future Vulcan and Mercury have marked out for the automobile in the United States?

Tonight's culmination of 6 years of show giving in the metropolis has far exceeded the most extravagant promises of their promoters, the rosiest hopes of enthusiasts and the wildest prophecies of the wiseacres.

Decoration Scheme of the Shows a Revelation

Into how artistically beautiful a show palace the architects and decorators have transformed old Madison Square garden, of whose graceful arches of light and mardi gras scheme of adornment we New Yorkers used to prate so proudly, is beyond conception. On the other hand, the Automobile Club of America management has been by far too modest in keeping the light of its show's intended embellishment too darkly hidden; for its

scheme of decoration has proved so far ahead of previous attempts as to relegate them to the barbarian past. It is now to laugh at the tawdry, transitory, circus-tent trappings of former years, which we scribes dignified by the word "decorations."

In both shows the effort has been toward harmonious uniformity. In both it has been sought to place every exhibitor on a plane of equality with every other one in the opportunity for displaying his exhibit and has left the competition to an out-and-out, standup battle royal among the cars displayed. Every showman is not only satisfied but delighted. The all around square-deal policy has been set and must in future prevail. The importers at their pretty little show at Herald square last year are to be credited with the initiative in the happy reform.

Automobile Boom Underestimated by Promoters

With two shows and double standing room to be filled there was some trepidation and guessing between the two as to which would draw the greater crowd. The outcome proved how foolish were the fears, how little was the need of guessing, how timid were those who underestimated the extent of the automobile boom that is sweeping the country and has seized New Yorkers in its unusually enveloping grasp. They had underestimated the value of advertising. Not only had both sets of promoters put forth acres of billboards and ads that in the aggregate might cover a city lot—a little strong but let it go—but makers had seized upon page after page of the papers, both trade and daily, to herald their exhibits. Add to all this, the column after column the scribes had given to foretelling the magnitude and magnificence of the coming exhibitions and you will not wonder that

A. WINTON

H. A. KNOX

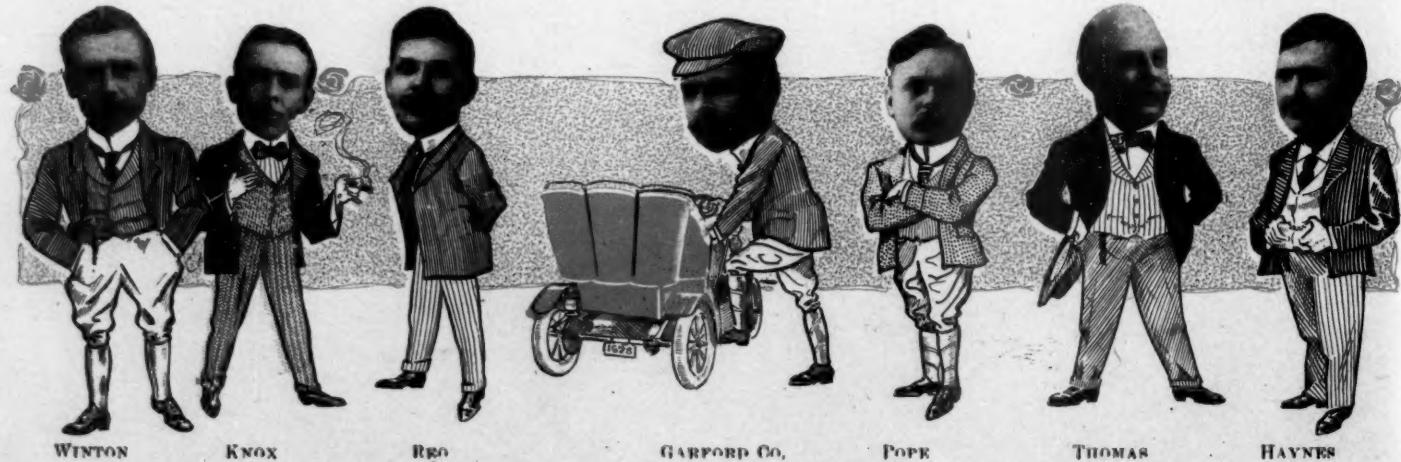
R. E. OLDS

A. L. GARFORD

A. L. POPE

E. R. THOMAS

ELWOOD HAYNES



Inaugurates Automobile Season



despite a nasty, drizzly, sleety night there was a crowd numbering hundreds gathered at the gates of the armory and the garden half an hour before they were thrown open.

Once free to them for entrance, an engulfing throng pushed one another in the aisles and crowded four deep the boundaries and jammed the available standing room of the stands. Outside thousands thronged the street in their passage from garden to armory and armory to garden. Reckoning the two shows as one exhibition, as is reasonable and right, no industrial exposition or indoor display of a sport ever gathered such a crowd in the city's history. Six-day bicycle races! Record beaten! Horse shows! It is to laugh!

Whence the Crowd Came

It can be only guesswork as to the percentage of visitors who went to both shows. It is pretty certain, though, that all to whom the attraction was the automobile attended both. Madison Square garden has an enormous following, which goes to every function held there just because others go. These were there tonight with added hundreds attracted by the stories of wonderful decorative effects to be seen. It is probable that those who were attracted to the automobile club's show to view the city's newest armory equaled in number the floating and regular attendance at the garden.

One entered Madison Square garden through a lane of freshly-cut pine trees illuminated above by garlands of electric lights, which, by the way, will show a distinctive color each night. These pine trees were in evidence everywhere in carrying out the outdoor scheme of a garden, the foundation idea of S. R. Ball,

the architect, in the decorations. Passing beneath a pergola of verdant trellis work, the visitor entered a vast Italian garden—above golden stars in a sky of blue, ahead and at the sides colonnades of pillars shading in the distance into lofty porticos, and mountains beyond. The pillars and all the staff work were white. The whole effect was white and gold, with blue sky above and light green hanging at the sides.

Splendid Designs in Statuary

On one side "The Chauffeur"; on the other "The Automobile Girl." Directly in front beneath an arch was a fountain with water spouting from the mouths of gold frogs and lighted by different colored lights thrown from the gallery. The statue of a woman of heroic size was the centerpiece of the fountain. Straight down the garden from the arch was a line of white pillars, each topped in ornamental gold work and connected by a string piece with a big electric globe at the top of each pillar. This line of pillars terminating in another arch at the further end ran down the center section of the garden. It must be borne in mind that this year there is but a single encircling aisle with a solid section in the center and enveloping sections on the out-

G. N. PIERCE A. L. RIKER G. W. BENNETT W. T. WHITE C. E. DURYEA HENRY FORD E. H. CUTLER W. E. METZGER





MEMBERS OF THE 400 ATTENDED BOTH SHOWS

side to accommodate the vast crowds which thronged the place.

At the sides the effect was of an encircling colonnade filled in the background with fir trees. Along the strong piece—the writer is not very well up in architecture and must apologize for some of the words he uses to convey his meaning—connecting the tops of the pillars at the side in plain and uniform letters of gold were the names of the exhibitors or the cars they showed. Above the signs were long lines of reflectors illuminating the signs. There were no railings to the stands, of course, and the cars rested on a floor of dead gold carpeting.

High up above the Madison avenue end was the music-stand, with a harp in yellow electric lights, and at the further end garlands of yellow lights setting forth the A. L. A. M. shield and forming the base of the terraced and colonnaded garden above. The main floor was devoted exclusively to gasoline pleasure cars, the importers' section occupying the entire side north of the aisle and under the raised platform, whereon were exhibits of the association of accessories manufacturers.

White and Light Green the Color Scheme

The railing around the raised platform was hung in white. The stands were of the same colonnade scheme as on the main floor, but were backed with box-pleated white silkline. Above was a drapery of light green, which, mingled with white, constituted the color scheme of the decorations of the gallery above the raised platform, which was also devoted to the display of sundries. High up above all were staff figures of classic females holding garlands of red electric lights.

Down in the basement, where were shown the commercial vehicles; in the exhibition hall at the right of the entrance, better known as the restaurant, devoted to electric pleasure vehicles, and in the concert hall, where machinery and parts were in view, the same scheme of white colonnades, gold signs and silk or pine tree backings was carried out.

This is but a miserably inadequate setting forth of a scheme of decoration, which is bound to create new standards hereafter in the public exposition of industries having to do with such beautiful luxuries as the automobile. While the A. L. A. M. show may fall behind the grandeur and impressiveness of the Paris salon given to it by numbers of exhibits and the vastness

of the Palais de l'Industrie from the standpoint of beauty and art in its fittings and environment, it has no reason to blush at a comparison. It is worthy of note that the effect of the scheme was to greatly enhance the impression of the size of the auditorium. From the business standpoint perfect uniformity and perfect equality for all exhibitors were attained.

Armory's Great Drill Room of Impressive Grandeur

In itself the great drill room of the Sixth-ninth regiment armory gives the visitor an impression of proportions much more vast than does the garden. With but a single gallery the arch of the roof seems to stretch way up toward cloud-land and so one was not a bit startled when he saw balloons and an airship soaring in the ether above him, pointing impressively to the fact that the Automobile Club of America, the pioneer motor car organization in this country, had become once more a pioneer in a new use of the motor in realms above the land and sea by inviting the Aero Club of America to join with it in giving the first show of aerostatic art ever attempted in the United States.

Climbing to the gallery and omitting to glance up at the unadorned arches above the airship strata or the big, bare brick wall that faces the entrance—you must remember that the armory was rushed through to completion for this show, which gave no time for attention to things above in the decorative line—and glancing around and about you, you will be amazed to see what a beautiful exhibition good old Sam Butler and the show committee have prepared for you without any previous horn-blowing or preliminary promises. It has been anticipated that the club would have little time to devote to an elaborate decorative scheme, but rather let its most comprehensive display of pleasure and commercial vehicles of all three persons speak for itself with the added novelties of an airship exhibition and vitagraph views of great racing events; and trade and association meetings, club gatherings and other features furnish the necessary attraction to the motorist and the curiosity seeker.

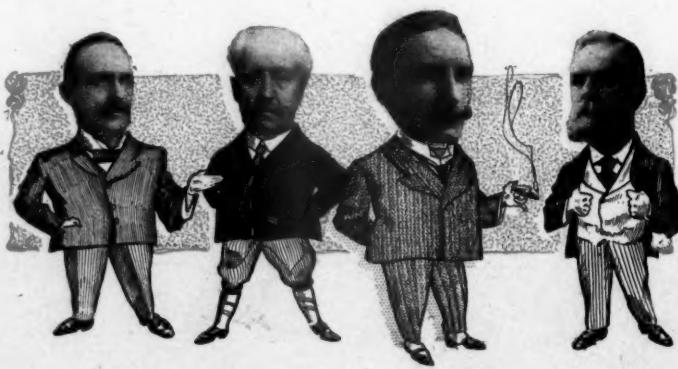
The club management, though, might have bragged a bit on its own decorative scheme, for it has produced a show which in uniformity of arrangement and beauty of embellishment places it far ahead of any previous attempt in this country in industrial or sporting show environment.

Green and Gold in Evidence at the A. C. A. Show

In the first place the layout of that part of the show which occupies the drill room is in four longitudinal aisles, with an encircling rectangular aisle having on its outside nearest to the wall also a line of booths. The color scheme on the main floor having to do directly with the signs and decorations of the stands is green and gold, to which is added above around the edge of the gallery and in the hangings above the booths there located, adding to general beauty of this magnificent spectacle.

Each section of the main floor is divided longitudinally by a string of posts supporting a line of signs. These signs have a background of the prevailing dark green. The names are lettered in gold and each sign is separated from its neighbor by the club emblem in gold. Reflectors are arranged along the top to throw light upon the signs just as they are at the garden.

GEORGE H. DAY R. B. McMULLEN L. M. WAINWRIGHT COL. A. A. POPE



A. L. A. M. A. M. C. M. A. DIAMOND CHAIN POPE

The gallery edge is hung with green on a white background pinned with the club emblem, familiar to all visitors at former shows in this city. The gallery booths, which are all devoted to accessories, are green marques, with overhanging shelters. White triangular bannerettes bearing the club emblem float on poles above and at the sides. The scheme is simple and uniform. The whole effect is artistic and beautiful.

It must be remembered, though, that only part of the show is embraced by the four walls of the big drill room. Downstairs in the basement—or rather on the ground floor, for one has to ascend a flight of stairs to reach the drill room—in halls and separate rooms there are exhibits of commercial vehicles, machinery, etc. Then again the score, or two-score, or whatever may be the number of the regiment's company rooms, are each devoted to separate exhibitors. It is a toss up whether the showman in the big drill room, whose display may be seen by all comers, or the exhibitor, who has a room to himself for his visitors and customers, has the better of the layout.

In a word, the whole building is one vast exposition, selling mart and hive of trade and sport associations and motor clubs. The Automobile Club of America, the New York Motor Club, the American Motor Car Manufacturers' Association, the Long Island Automobile Club, the American Automobile Association, and heaven knows what other organizations having to do with motoring, all have rooms to themselves.

Numerical Strength of the Two Exhibitions

Such a crowded opening night as tonight and with many more cars likely to come in on Monday and during the early part of the week, complete as the exhibits appeared to the casual observer there was small chance given to make a census of the automobiles on view and their distribution. MOTOR AGE's technical men will give the figures later elsewhere in these columns. A count of the advertised complete machine exhibits as set forth in the advertisements of each show gives fifty-six makes for the garden and sixty-eight for the armory, separated as follows:

Garden—American gasoline, 30; imported gasoline, 11; American electric, 7; European electric, 1; commercial, 7.

Armory—American gasoline, 37; American steam, 3; imported gasoline, 19; American electric, 2; commercial, 7.

In the above the Pope-Toledo, Hartford, Tribune and Waverley are counted as separate makes. Three imported cars—Renault, Panhard and Mercedes—are on view at both shows. Four makes of motor cycles are at the armory; none at the garden. At the garden six of the seven exhibitors of commercial vehicles also show pleasure cars. At the armory two of the seven are in the same category. There are probably between 500 and 600 cars on view at the two shows.

Twenty-eight members of the A. L. A. M. show pleasure cars at the garden. Twenty members of the A. M. C. M. A. exhibit pleasure vehicles and one a business wagon at the armory.

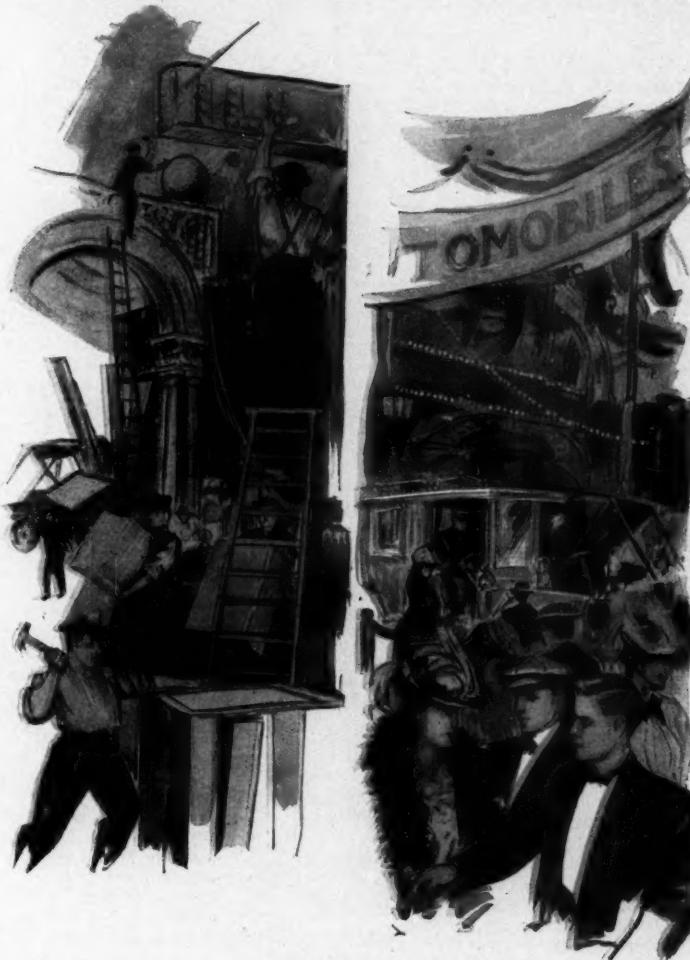
Both Shows Ready When Curtain Goes Up

Both shows presented tonight to the visitor a complete appearance. To the armory people, however, belong the greater credit of having accomplished the more within the allotted time. It must be remembered that the building the club secured is even now practically still in the course if not of erection at least of interior finishing. When the writer visited it a week ago today it seemed hardly possible it could be brought to anywhere near a finished state in time. Three days' more labor, however, in the drill room sufficed to permit the sign builders and decorators to take hold. The armory exhibitors were impatient, and by Thursday began to move in their cars. The big rush came on Friday, and this morning it was pandemonium and babel combined. Tonight the stands are fairly jammed with cars, so vast is the exhibit in numbers, and still there are complaints of lack of sufficient room to show all models. Work as heroically as did the hustlers on the building, there was one much needed part of the task still uncompleted tonight. It had been impossible to make the electric connections with the reflectors illuminating the signs, so there were only the hanging

incandescents to furnish the light. This detracted from the needed brilliancy which the lights over the signs would have made adequate. When the unavoidable omission is supplied the show will doubtless take on new beauty.

Garden Described as Dream of Loveliness

At the garden, complete in itself, the task of preparation was easier. The building had been given over to the architects and decorators for a week. It was a big task, but there was an army of men at hand to accomplish it. By Friday afternoon, when George H. Day and the show committee met the newspaper men for a private view, everything was complete save a few sign letters to be placed. At a luncheon at the Prince George, which followed the inspection and at which fifty or more scribes sat down, Mr. Day and Col. George Pope, chairman of the show committee, were the recipients of enthusiastic congratulations. If the garden empty was beautiful, it was a dream of loveliness when the lights were turned on tonight and



SATURDAY AT THE GARDEN—MORNING AND EVENING.

the stands were filled with handsome cars. Today alone sufficed to move in the cars.

Exhibitors are preparing for a busy week of it without as well as within the shows. Each one has provided at least one duplicate of every model for demonstrations outside. The aggregation of these trial machines promises to be one of the great sights of the week. It is expected that Fifth and Madison avenues will swarm with them.

There will be fewer meetings and trade dinners than formerly. The A. L. A. M. will refrain from them altogether so as not to interfere with the strict attention of exhibitors to their stands. The Hyatt Roller Bearing Co. will give its usual annual banquet to the trade. The Maxwell-Briscoe Motor Car Co. has laid out a novel and elaborate scheme of entertaining, which consists of a daily luncheon at the Café Martin. It is said 2,000 invitations have been given out.

EXHIBITORS at the GARDEN

Henry A. Allers & Co.
 American Ball Bearing Co.
 American Darracq Automobile Co.
 American Electric Novelty Co.
 Apperson Brothers Automobile Co.
 Atwater Kent Mfg. Co.
 Atwood Mfg. Co.
 Aurora Automatic Machinery Co.
 Auto Brass and Aluminum Co.
 Auto Import Co.
 Auto Supply Co.
 Autocar Co.
 Autocoll Co.
 Auto Top and Cover Co.
 Badger Brass Mfg. Co.
 Baldwin Chain and Mfg. Co.
 Babcock Electric Carriage Co.
 Belden Automobile Transmission Co.
 E. M. Benford.
 Bethlehem Steel Co.
 Briscoe Mfg. Co.
 Sidney B. Bowman.
 S. F. Bowser & Co.
 Brennen Mfg. Co.
 Brown-Lipe Gear Co.
 Buick Motor Co.
 Byrne-Kingston Co.
 Cadillac Motor Car Co.
 Cantano Electric Traction Co.
 Carpenter Steel Co.
 Albert Champion Co.
 Columbia Lubricants Co.
 Columbus Buggy Co.
 Consolidated Mfg. Co.
 Continental Caoutchouc Co.
 Cooper-Hewitt Electric Co.
 William Cramp & Sons Co.
 Dac Automobile Supply House.
 Dayton Electrical Mfg. Co.
 Decauville Automobile Co.
 DeDietrich Importing Co.
 Diamond Chain Mfg. Co.
 Diamond Rubber Co.
 Duplex Igniter Co.
 Diezmann Shock Absorber Co.
 R. E. Dietz & Co.
 William J. Daune & Co.
 Duff Mfg. Co.
 Eastern Carbon Works.
 Edmunds & Jones Mfg. Co.
 Electric Vehicle Co.
 Elmore Mfg. Co.
 English & Mersick Co.
 Horace E. Fine.
 Firestone Tire & Rubber Co.
 Fisk Rubber Co.
 H. H. Franklin Mfg. Co.
 A. H. Funke.
 Gabriel Horn and Mfg. Co.
 Gallia Electric Carriage Co.
 Gas Engine and Whistle Co.

Gilbert Mfg. Co.
 B. F. Goodrich Co.
 Goodyear Tire and Rubber Co.
 Gray & Davis.
 G and J Tire Co.
 C. T. Ham Mfg. Co.
 R. E. Hardy Co.
 A. W. Harris Oil Co.
 Hartford Rubber Works Co.
 Hartford Suspension Co.
 Hatch & Brittan Co.
 Haynes Automobile Co.
 Heinz Electric Co.
 Hess & Co.
 Hess-Bright Mfg. Co.
 Hewitt Motor Co.
 Hollander & Tangeman.
 Holly Bros. Co.
 Henry Hooker & Co.
 Hyatt Roller Bearing Co.
 Hydraulic Oil Storage Co.
 Imperial Brass Mfg. Co.
 International A. & V. Tire Co.
 Iron Clad Mfg. Co.
 Phineas Jones & Co.
 Jones Speedometer.
 Judson & Downing.
 Knox Automobile Co.
 Lackawanna Leather Co.
 Light Mfg. and Foundry Co.
 Locomobile Co. of America.
 Lunkenheimer Co.
 McCord & Co.
 McGlehan Mfg. Co.
 Manhattan Storage Co.
 Manufacturers' Foundry Co.
 Matheson Motor Car Co.
 H. and F. Mesinger & Co.
 Michelin Tire Co.
 Midgley Mfg. Co.
 Midvale Steel Co.
 Milwaukee Rubber Works Co.
 Charles E. Miller.
 Morgan & Wright.
 A. R. Mosler & Co.
 Motor Car Equipment Co.
 Motor Car Specialty Co.
 Motisinger Device Mfg. Co.
 L. J. Mutty Co.
 National Battery Co.
 National Carbon Co.
 National Sales Corporation.
 New York Carriage Top Co.
 New York Sporting Goods Co.
 New York and N. J. Lubricant Co.
 Noera Mfg. Co.
 Northern Mfg. Co.
 Olds Motor Works.
 Oliver Mfg. Co.
 Panhard Motor Car Co.
 Parish & Bingham Co.

Packard Motor Car Co.
 Patterson, Gottfried & Hunter.
 Peerless Motor Car Co.
 Pennsylvania Rubber Co.
 George N. Pierce Co.
 Pittsfield Spark Coll Co.
 Pope Mfg. Co.
 Pope Motor Car Co.
 Post and Lester Co.
 Prest-O-Lite Co.
 Thomas Prosser & Son.
 Railway Appliances Co.
 Remy Electric Co.
 Republic Rubber Tire and Shoe Co.
 Rose Mfg. Co.
 Roth Jack and Tool Co.
 Royal Motor Car Co.
 Leon Rubay.
 Rushmore Dynamo Works.
 Samson Leather Tire Co.
 Schwarz Wheel Co.
 Semi-Dry Battery Co.
 Shelby Steel Tube Co.
 Sibley & Pitman.
 Edward Smith & Co.
 Smith & Mabley.
 Smith & Mabley Mfg. Co.
 Spicer Universal Joint Mfg. Co.
 C. F. Splidford.
 Sprague Umbrella Co.
 Springfield Automobile Top Co.
 Springfield Metal Body Co.
 Standard Roller Bearing Co.
 Standard Welding Co.
 F. B. Stearns Co.
 Steel Ball Co.
 J. Stevens Arms and Tool Co.
 Studebaker Automobile Co.
 Swinehart Clincher Tire and Rubber Co.
 E. R. Thomas Motor Co.
 Timken Roller Bearing Axle Co.
 Utility Co.
 Vacuum Oil Co.
 Valentine & Co.
 Veeder Mfg. Co.
 Vehicle Equipment Co.
 Walter Automobile Co.
 Waltham Mfg. Co.
 Warner Gear Co.
 Warner Instrument Co.
 Way Muffler Co.
 Webb Co.
 Weed Chain Tire Grip Co.
 F. H. Wheeler.
 Whitlock Coll Pipe Co.
 Whitney Mfg. Co.
 E. J. Willis Co.
 Winton Motor Carriage Co.
 Witherbee Igniter Co.
 Wray Pump and Register Co.

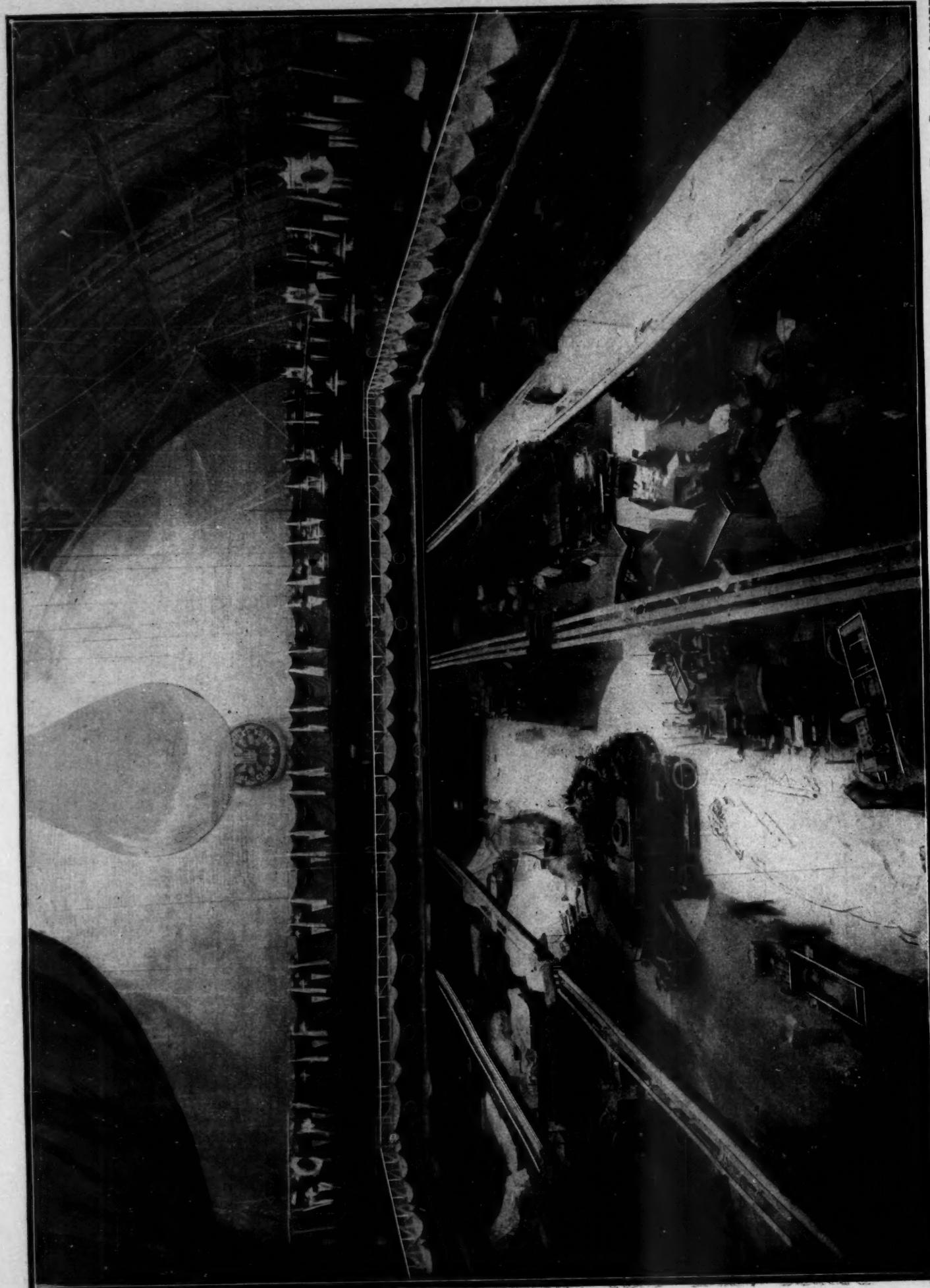
EXHIBITORS at the ARMORY

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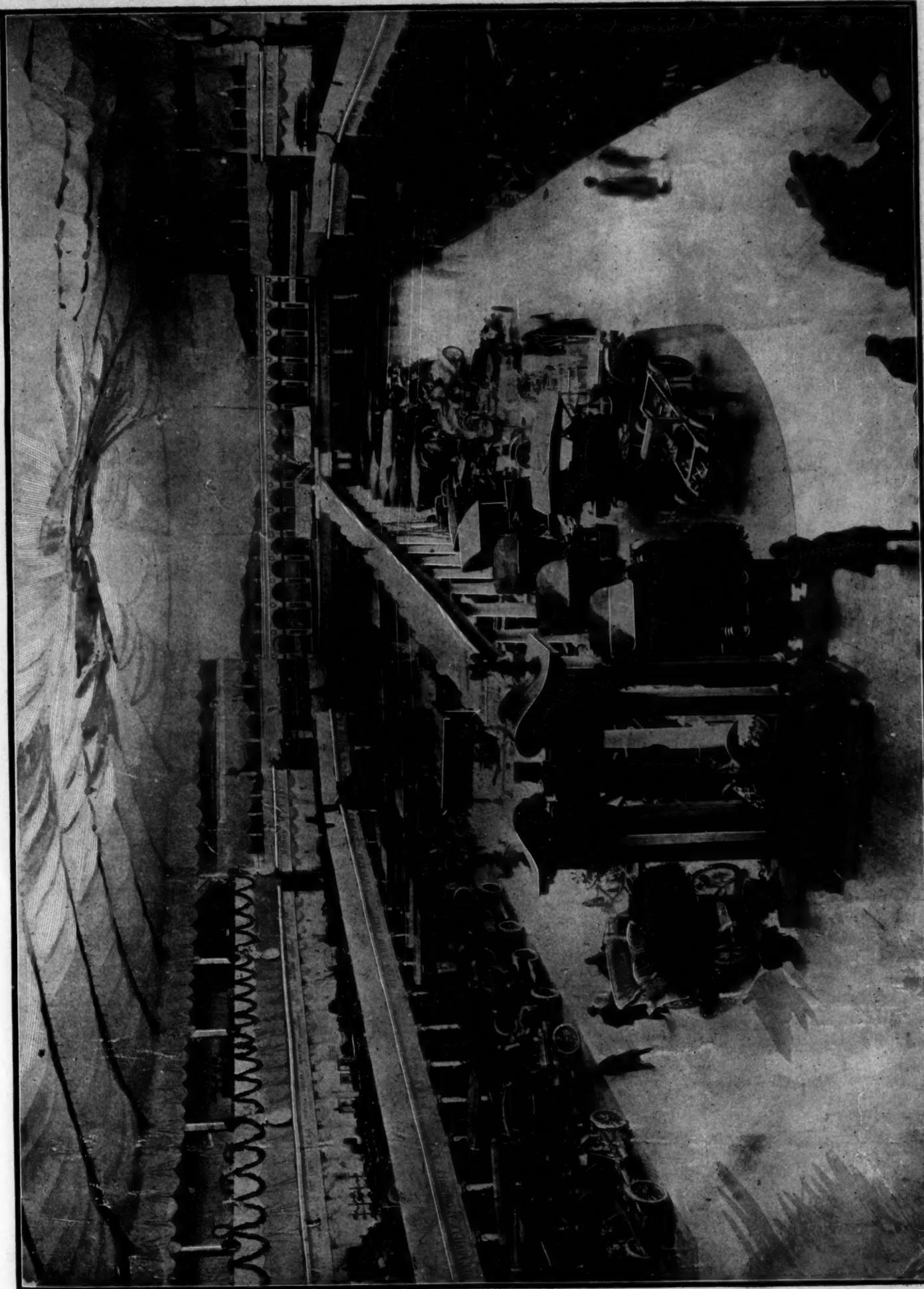
Aster Co.
American Motor Co.
American Ball Bearing Co.
American Generator Co.
Archer & Co.
American Motor Co.
American Peugeot Automobile Co.
American Locomotive Co.
Austin Automobile Co.
Acme Motor Car Co.
Ardis Motor Car Co.
Auto Supply Co.
Aurora Automatic Machinery Co.
Auto Lock Plug Co.
Auto-Car Equipment Co.
Anderson Spark Plug Co.
Breeze, Lawrence & Moulton.
John Boyle & Co.
Baker Motor Vehicle Co.
C. H. Blomstrom Motor Co.
E. W. Bliss & Co.
Bartholomew Co.
Bertilli & Co.
Boehm & Levine.
Buckeye Mfg. Co.
Badger Brass Mfg. Co.
Briscoe Mfg. Co.
Baldwin Chain Mfg. Co.
Brown-Line Gear Co.
Byrne-Kingston & Co.
Belden Automobile Transmission Co.
F. M. Brown.
W. H. Brown.
Berkshire Automobile Co.
S. F. Bowser & Co.
Crawford Automobile Co.
Carey Motor Co.
Central Park Automobile Storage Co.
Chadwick Motor Car Co.
Columbia Lubricant Co.
Commercial Motor Car Co.
Central Automobile Co.
Corbin Motor Vehicle Corporation.
Charron, Girardot & Voight.
Cryder & Co.
Cleveland Motor Car Co.
William Cramp & Sons Co.
Continental Caoutchouc Co.
Cook's Railway Appliances Co.
Connecticut Telephone and Electric Co.
Consolidated Rubber Tire Co.
Canton Electric Tractor Co.
Daimler Mfg. Co.
Duryea Power Co.
Dayton Motor Car Co.
Detroit Motor Car Supply Co.
Detroit Tool Co.
Duff Mfg. Co.
Diamond Rubber Co.
Diamond Chain and Mfg. Co.
Dayton Electrical Mfg. Co.
R. E. Dietz Co.
Dorris Motor Car Co.
John S. Doisom & Sons.
Julian F. Denison.
Dac Automobile Supply House.
Electric Rubber Mfg. Co.
Everlastic Tire Works.
E. B. Gallaher.
Electric Storage Battery Co.
English Daimler.
E. H. V. Co.
Edison Storage Battery Co.
Edmunds and Jones Mfg. Co.
Eastern Carbon Works.
Ford Motor Co.
Fisk Rubber Co.
Firestone Tire and Rubber Co.

Grout Brothers Automobile Co.
Gearless Transmission Co.
Gray & Davis.
Goodyear Tire and Rubber Co.
Gilbert Mfg. Co.
Gabriel Horn and Mfg. Co.
G and J Tire Co.
F. A. Goebel.
Gray-Hawley Mfg. Co.
Gleason-Peters Air Pump Co.
E. F. Goodrich Co.
A. W. Harris Oil Co.
R. E. Hardy Co.
Hendee Mfg. Co.
Hyatt Roller Bearing Co.
Hartford Suspension Co.
Hess-Bright Mfg. Co.
Hatch and Brittan Co.
Harburg Tire Co.
Hartford Rubber Works Co.
Hicks Automobile Co.
E. F. Hodgson.
R. M. Hollingshead Co.
Hutchinson Electric Horn Co.
Hill Mfg. Co.
Iroquois Iron Works.
Iroquois Motor Car Co.
Iron Clad Mfg. Co.
International A. and V. Tire Co.
J. G. Judson Co.
Thomas B. Jeffery & Co.
Jackson Automobile Co.
Judson & Downing.
Johnson Service Co.
Jones-Corbin Motor Corporation.
Knox Motor Truck Co.
Klean-Al Mfg. Co.
Kinsey Mfg. Co.
Kirkham Motor Co.
Lansden Co.
Le Nonpareil Muffler Co.
Louis & Matthews Co.
Lock Switch Mfg. Co.
F. Lowenstein.
Lebanon Motor Works.
Lozier Motor Co.
Lane Motor Vehicle Co.
Light Mfg. and Foundry Co.
Logan Construction Co.
Oscar Lear Automobile Co.
Mayo Radiator Co.
Mendel, Dale & Co.
Manufacturers' Can Co.
B. Morgan.
Norris N. Mason.
Mors Automobile Co.
Charles E. Miller.
Moon Motor Car Co.
Maxwell-Briscoe Motor Car Co.
Mitchell Motor Car Co.
Moline Automobile Co.
Marion Motor Car Co.
Motor Car Equipment Co.
McGlehan Odometer and Mfg. Co.
McCord & Co.
A. R. Mosler & Co.
Madison-Kipp Lubricant Co.
Metallic Rubber Tire Co.
Mills Mfg. Co.
McCrean Motor Truck Co.
Mitchell Punctureless Pneumatic Tire.
Morgan & Wright.
Napier Motor Co. of America.
Nordyke and Marmon Co.
National Motor Vehicle Co.
New York Sporting Goods Co.
National Carbon Co.
New York and N. J. Lubricant Co.
Oliver Mfg. Co.

F. W. Ofeldt & Co.
Palmer & Christie.
Pungs-Finch Automobile Co.
Palais de l'Automobile.
Panhard & Levassor.
Premier Motor Mfg. Co.
Premier Mfg. Co.
Pennsylvania Rubber Co.
Parish and Bingham Co.
Prest-O-Lite Co.
Post Mfg. Co.
Page Automobile Co.
Thomas Prosser & Co.
J. M. Quimby & Co.
Reo Motor Car Co.
Renault Brothers' Agency.
Rainier Co.
Leon Rubay.
Railway Appliances Co.
Randa Mfg. Co.
Rose Mfg. Co.
Remy Electric Co.
Republi Rubber Co.
Republi Rubber Tire and Shoe Co.
Richard, Francois.
Rapid Motor Vehicle Co.
Rausch and Lang Carriage Co.
Randall Falchney.
Reading Standard Cycle Co.
Robinson Fur Co.
Rollins Mfg. Co.
Safety Electric Elevator Co.
Sherwin-Williams Co.
Speed Changing Pulley Co.
St. Louis Motor Car Co.
Saks & Co.
Scandinavian Fur and Leather Co.
Steel Ball Co.
Shelby Steel Tool Co.
C. F. Splitdorf & Co.
Standard Welding Co.
Spicer Universal Joint Mfg. Co.
Springfield Metal Body Co.
Sprague Umbrella Co.
Standard Roller Bearing Co.
Survey Map Co.
Safety Motor Power Co.
St. John Rubber Tire Co.
Arthur J. Slade.
St. Louis Car Co.
Timken Roller Bearing Axle Co.
Twyford Motor Car Co.
Twombly Power Co.
E. Teel & Co.
Thermolite Co.
Twentieth Century Mfg. Co.
Uncas Specialty Co.
Veedee Vibrator Co.
Veeder Mfg. Co.
Viqueot Co.
White Sewing Machine Co.
Welch Motor Car Co.
Wayne Automobile Co.
Worcester Pressed Steel Co.
Witherbee Igniter Co.
Warner Instrument Co.
Warner Gear Co.
Wray Pump and Register Co.
Whitlock Coll Pipe Co.
Webb Co.
Whitney Mfg. Co.
Wheeler Mfg. Co.
Western Tool Works.
Wagner Motor Cycle Co.
Westinghouse Co.
John G. Wichman.
E. J. Willis Co.
Windsor Automobile Co.
Wells-Light Mfg. Co.



GENERAL VIEW OF THE INTERIOR OF THE SIXTY-NINTH REGIMENT ARMORY



GENERAL VIEW OF MADISON SQUARE GARDEN, TAKEN FROM NEAR THE MAIN ENTRANCE

THE 1906 SHOW OF THE ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS

A RAMBLE THROUGH THE GALLERIES



New York, Jan. 15—The galleries! The words mean much in the world's history. Whether it was the galleries of the Luxembourg or the balconies from which the spectators in the Elizabethan theater watched the performance and threw peanut-shells on the heads of the gentry in the pit,—whether it be the galleries of the house of deputies or of the house of representatives,—the galleries always have a certain importance of their own and a certain fascination for the mob.

It is even so in the automobile shows. Time was when the galleries were only an adjunct,—merely a side show,—and people went there when everything else had been seen and when they were tired and were capable only of dragging weary feet along the edge of the platforms and seeing the displays only in the interests of completeness or so they could tell Billy that they had been there.

That's all changed now. The galleries are fully as important as the ground floor and many a spectator hastens there at the start. If he is an owner he is interested in picking up the newest device or the most modern accessory to complete his equipment. Even if he is an agent, the cars can wait. He knows in a general way what the new lines are—a careful perusal of *MOTOR AGE* has fixed that in his mind. But there are a whole lot of things he will have to learn and the best way to learn them is to begin at the parts and accessories headquarters and proceed in constructive lines rather than analytically. So he rushes to the galleries first and takes the cars more sedately and leisurely later.

This year he finds the galleries a stupendous undertaking. Unless he uses a good deal of care and system he comes away after 2 days of investigation with the notion that the galleries are a mass of brazing compounds, taper pins, oil-hole covers, T. J. Wetzel, electric generators, steel rims, vulcanizers, sandwiches, connecting rods, graphite, injectors, acetylene generators, Whit bumpers, enamels, lamps, pattern makers, wrenches, sparking points, gasoline motors, hydrometers, lamp covers, Charley Splitdorf, horn screens, automobile robes, wood rims, spark plugs, pneumatic tires, wire spokes, anti-skidding devices, Billy Culver, motor bonnets, sheet iron, jacks, washing machinery, tool bags, cloth and carpet trimmings, vaporizers, Dave Post, foot warmers, wire connectors, eye shields, acetylene tanks, carbide, condensers, boiler pumps, hot air, circulating pumps, metal trimmings, turnbuckles, markers, radiators, boiler shells, Fritz Vanderhoop, artificial leather, Carl Kaufman, pressed steel frames, tire alarms, oils, special soaps, packing, primary batteries, clutches, clocks, Herb Githens, goggles, gasoline funnels, motor cycle accessories, Charley Miller, stamping, wire terminals, brass and copper tubing, spark timing devices, H. E. Raymond, coolers, drop forgings, carriage heaters, ball bearings, altitudemeters, name plates, grease cups, Otis Cook, polishers, boiler tubes, safety valves, oil cans, screws, hampers, boilers, iron castings,

indicators, rubber cloth, cock-tails, lock-nuts, washers, cups, cones, ejectors, igniting devices, rails, wood wheels, voltmeters, bad cigars, steel shafting, storm shields, babbitt metals, Schwartzy, nickel-plating outfits, axles, spark coil boxes, channels, gear cases, gas-lamp burners, baskets, H. W. Chapin, hampers, touring cases, pipe coils, steel tubing, brass, copper, water glass lamps, Dick Welles, dynamos, ball retainers, hardware, insulators, electric welding machines, tanks, leggings, V. G. Apple, gasoline motors, oil guns, running gears, gasoline tank gauges, chains, canopies, Joe Gilbert, roller bearing axles, reverse marine gears, C. L. Stevens, tire plugs, wire wheels, tire valves, electric switches, leaf springs, spark gaps, Uncle Barnes, porcelain insulators, brass and copper rods, mica, lubricants, kerosene motors, cycle motors, gear blanks, iron, steel, lamp brackets, Jacob Schreyer, gasoline tank indicators, Sam Randolph, automobile hubs, carbon, brushes, axle ends, combination wood and wire wheels, the M. & A. M. A., aluminum, boiler tube expanders, greases, torch heaters, gear wheels, gaskets, cushions, leather, Jack Bowman, mountings, water column mirrors, tire repair kits, sprockets, speed indicators, piston rings, Frank Weston, hoods, brass fittings, gasoline engines, brake bands, curled hair, electric motors, pumps, wrought iron pipe, rheostats, Harry Sheldon, wood bendings, turn tables, automatic starters, O. J. Woodard, steel shells, odometers, guards, anvils, storm aprons, high-balls, asbestos, ball bearing axles, Peter Steenstrup, storage batteries, bronze bearings, bells, metallic bodies, boots, bow sockets, brakes, Leon Rubay, brake locks, braziers, George D. Wilcox, gasoline burners, kerosene burners, Bull Hall, cans, carburetors, cases, copper castings, steel castings, tire cement, charging equipments, clevises,



MAKING THE CUSTOMARY DEMONSTRATION

clothing, Paul Snutzel, commutators, compressors, brass couplings, dashes, fenders, dust shields, electrolyte, fire extinguishers, Continental Smith, ball floats, motor cycle frames and fittings, friction clutches, pressure gauges, waterline gauges, Cort Cramp, differential gears, transmissions, rawhide gear wheels, gloves and gauntlets, gongs, Charley Gillette, gradometers, grips, head lights, W. D. Winans, feed water heaters, horns, portable houses, lubricators, magnetos, rubber mats, perforated metals, cycle motors, Joe Grossman, mud guards, mufflers, non-fluid oils, paints, Chester Boynton, wood panels, platinum, pliers, nippers, fuel air pumps, tire inflators, pumps, Fred Billings, screw machine products, seats, springs, Billy Harwood, steel stamps, stencils, steering checks, steering knuckles, Arthur Hyde, steering wheels, steps, gasoline strainers, Horace De Lisser, studs, tachometers, cellular tires, leather tires, solid tires, tire cases, Carl Fisher, tire detachers, tire fluid, tire grips, tire protectors, tire shoes, tire tape, tools, tops, Jimmie Gilson, transfer ornaments, leather trimmings, George Monroe, flexible tubing, varnishes, water alarms, and columns, steel wheels, wheel truers, shock absorbers, Phil Dorn, insurance policies, more tires and seventy-six advertising men by actual count.

The galleries present food for thought in many particulars. The predominant impression is perhaps the completeness of the exhibits. It is true one can now begin at the beginning and trace the manufacture of an automobile from the raw material to the finished product. If the visitor desired to experiment, and knew just what to buy, he might, from the galleries, cull the entire machine piecemeal; that is to say, he might purchase all parts of the machine he desired and assemble them from the products shown by the parts and accessories men. Not only that, but he might add to his equipment everything in the shape of comforts and conveniences which he desired.

The effect of this condition is to give the owner and prospective buyer a very concrete idea of what goes into an automobile. It is possible, in other words, for the buyer at retail to go behind the agent or distributor and behind the manufacturer and know what ought to be used in the construction of the machine and what should not be used. The student of the gallery shows is therefore rendered discriminative. This phase of the case has had the effect of making buyers at retail more careful and more rigorous in their demands on the part of the manufacturer. Sometimes it makes them finicky, though this is the result of superficial examination rather than careful inspection, so that the dealer cannot fool the buyer now, whatever he may have tried to do at some stage of the development of the industry. Everything must be all wool and a yard wide or the buyer will not do business.

Another tendency in the galleries, betrayed in a study of the parts and accessories division, is that toward standardization. Specializing is responsible for this. The maker of novelties or even of the more staple details seeks to expand his market as much as possible. To do this he must make parts or accessories or equipments which are interchangeable and can be fitted to any machine. Hence the growth of the custom of standard measurement and the general equalization of things all through the trade.

Workmanship shows a wonderful development. The finishing of parts is now the subject of more attention than ever. The plating and polishing end of the business is more strikingly shown this year than has ever been the case.

Development in tires and tire accessories is perhaps the most striking detail which appears to the eye of the casual visitor. He is confronted on all sides with the development of the tire trade and the advances made in construction, in the devices for fastening the tires and the entry into this market of numbers of new makes, both American and foreign. Special treads, anti-skidding devices, etc., are much in evidence, and these show great advances in the line of construction. One has a chance to compare on fairly equable terms the appearance, if not the wearing qualities, of the various devices, new and old. All this means emancipation from the thralldom of a close or narrow market, and this is perhaps the most hopeful feature of the galleries. There are few novelties shown which promise a reduction in the

cost of tires, but the impression seems to be abroad that this will follow, as a matter of course, with the entrance of new tire companies and products into the market.

From a purely spectacular standpoint the accessories which may be included under the general term "automobile comforts" are far and away the most attractive feature of the galleries. Richness, finish and ornateness mark the upholstery, paint, lamp, odometer and speedometer, body and miscellaneous equipment features of the show. There is more scope for the man with the plethoric pocketbook and more variety in price for the man with the thin one. The choice is also much more varied than formerly. We are approaching the de luxe period and from mudguard to top, from radiator monogram to tail-light, the

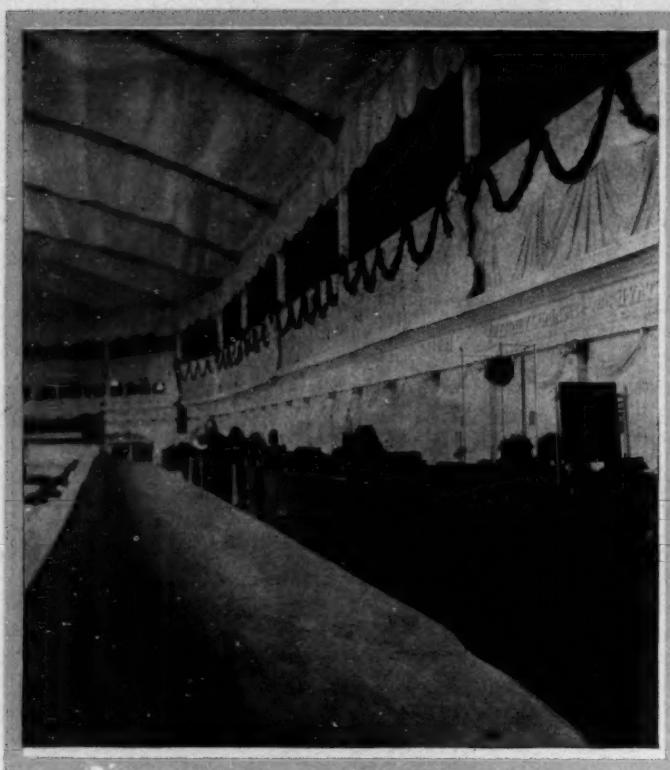


PEOPLE OF ALL CLASSES RUBBED ELBOWS AND WONDERED

tendency is markedly toward a more aesthetic appearance for the motor car. It is less and less a mere horseless carriage; it is more and more an object of art. As a matter of fact, neither in Europe nor in America has the horse-drawn vehicle approached anything like the perfection of finish and equipment which has been attained by the motor car. There is food for thought in this condition.

It is in the constructive details that the greatest progress has been made. The pressing of frames and the construction of bearings and parts in the raw show a great advance over previous years. There is also a disposition on the part of the exhibitors to display their wares to better advantage. The working demonstration is more general in its vogue. Oil makers show the oil running over inclined planes, so as to demonstrate its viscosity. Bearing makers show wheels, etc., mounted so the visitor can appreciate by visible signs what the work of the bearing or other device really means.

Instruments of precision are shown in action, or at least in such shape that the investigator never needs to leave the stand without having his curiosity satisfied. So it is throughout the gallery. There is not so much of the purely heaped-up dead exhibit which the visitor may admire for its beauty or skill of arrangement and pass on. The tendency is to make the spec-



BALCONY IN THE GARDEN, TWENTY-SEVENTH STREET SIDE

tator investigate and stick to the thing until he has mastered its details. This is true of both the garden and armory exhibits, though the armory people seemed to have grasped the idea more fully than the garden exhibitors. Perhaps this is simply chance and the fact that many of the armory exhibitors are comparatively new to the show business and anxious to do a lot of introduction may have something to do with the situation.

There are other signs to indicate that accessory and parts men are beginning to get the show principle down to a finer point than it ever has been. More of a tendency to be obliging and interesting is shown by most of the salesmen and demonstrators, and in the matter of furnishing the stands and attending to the comfort of the visitor, the shows of 1906 are far in advance of any which have preceded them.

Another detail noticed is the fact that most of the gallery people are not afraid to advertise others by telling where their accessories are to be found on the cars in other exhibits. This seems to be a movement which is general. Some of them even go so far as to label their goods with the car for which the special article is built. There is less of that hidebound jealousy which has characterized the attitude of some exhibitors at the automobile exhibitions of the past.

You no longer hear the sound of the anvil chorus as it hammers away at the well-earned reputation of some part or accessory, nor do the booth attendants attempt to foist some article on the questioner with the "just as good" gag which has been worn to death by the corner druggist trying to unload some goods he has been stuck with. It seems to be the universal motto that if good cannot be said of a rival's wares or if his competition is to be feared that the best way is to keep quiet on that point and endeavor, by means of strong argument, to convince the skeptic that the part shown in that particular booth is well worthy of consideration and really all it is claimed to be. That this style of salesmanship is appreciated by the educated motorists is clearly apparent by the close attention paid to the remarks made by the attendants. The general run of gallery ramblers seems to consist of people who do not go up there through idle curiosity, but with a desire to learn something through their own observations. In the old bicycle days the gallery was the one place in the show where a rich harvest of souvenirs could be gathered, but the modern automobile show has no use for

such truck and the gallery, more than the main floor, profits through the cutting out of this craze. To the critic wandering up to the gallery for inspiration all this is a pleasing change. He looks around, sees the busy throng, listens to the hum of conversation and from its threads gathers the realization that a spirit of good fellowship prevails throughout the crowded place and that the days of better feeling are over and that the salesman at last realizes that it is far better to boost than to knock.

All this is not strange, because it is the psychological effect of the organization of shows where the decorations are uniform and the various exhibitors are more or less interdependent regarding the division of the spoils after the shows are over. The tendency seems to be toward the development of the automobile family, rather than to nourish the fierceness of competition. This is not to say that there is any lack of actual trade competition. But the inclination shown is to produce better results and win on the merits of the article produced rather than to deify the products of the other fellow.

BROCK TALKS OF SHOW

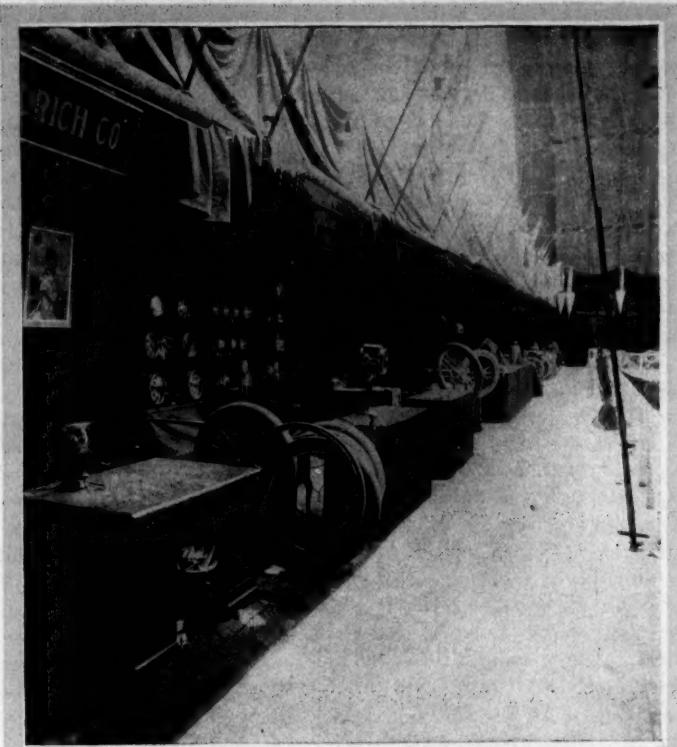
New York, Jan. 15—Assistant Manager Brock of the Association of Licensed Automobile Manufacturers, who has been on the committee of the Madison Square garden show for nearly a year, is enthusiastic over the manner in which the exhibitors took hold of this year's affairs. Seen the other day at the garden, where he was overseeing the workmen, Mr. Brock said:

"I can truthfully say that I have never had as pleasant a bit of work as the strenuous labor of arranging the Madison Square garden show of 1906. Our show committee was comparatively new at the game, you know, and expected all sorts of difficulties. We have been agreeably disappointed. The exhibitors as a whole did almost no kicking at all when the allotments of space in the garden were put out. This, I am told, is an unprecedented condition in the preparing and management of shows. Those who have had to do with the organization of former shows, both here and in other cities, tell me that they have had all kinds of difficulties. But for some reason, we seem to have escaped all of them at the present show.

"I want to say, in connection with the organization of this show, that we have had a great deal of help from the accessory makers' association. Its committee, consisting of Messrs. Raymond, Post and Steenstrup, coöperated with us from the very



GALLERY IN THE GARDEN, TWENTY-SIXTH STREET SIDE



TWENTY-FIFTH STREET SIDE OF GALLERY IN ARMORY

first, and the allotment of space, in the galleries and at various other places, to the accessory and tire men, was accomplished without any friction whatsoever. I feel as if the organization of national shows had come to be second nature to me, and I should not want any better fun than to start in again now.

"The association has spent a considerable sum of money on the decorative side of this exhibition, but we feel that the time has gone by when automobile shows can only be vast warehouses, and that the public is entitled to something in a spectacular way for the money it puts up at the gate."

Mr. Brock said, apropos to the talk about earlier shows, that while he was not prepared to discuss the advisability of this, he did not believe it would be possible to hold the annual show earlier in the season in New York for some years, if it was held at the garden. The show committee has met with some criticism because of restrictions in complimentary and trade tickets which have been imposed this year, but Mr. Brock explained that these were necessary, on account of the conditions. "Great numbers of trade tickets were sold to speculators and resold on the sidewalks last year," said Mr. Brock.

THE AERO CLUB EXHIBIT

The Aero Club of America surprised the automobile show public with its exhibit of air-ships, balloons, etc., at the armory. The great success of the French Aero Club, along the same lines, emboldened the American pioneers to step into the limelight, after only 3 months of organization. The results show far more remarkable progress made in aerial science than the public imagined. Santos-Dumont's machine, which he has been in the habit of calling his runabout, is the star of the aeronautic exhibit. Besides Santos Dumont's airship there are several other exhibits from France, and a number of prominent aeronauts have come over to study what is being done in this country.

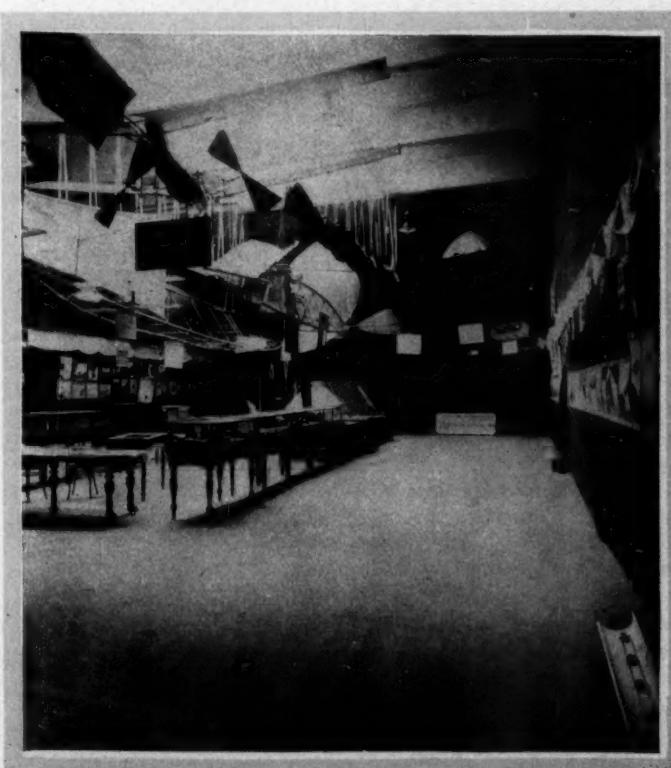
A great variety of models is shown, illustrative of the growth of the science. There is, also, considerable apparatus for the study of its principles and instruments for exploring the atmosphere. The manufacturers of aeronautical appliances are well represented. M. Malet, the balloon maker of Paris, has sent a full exhibit of his aerostats and paraphernalia. Every man in America, whose work has a bearing on aerial navigation, was asked to contribute his quota. Octave Chanute has sent an ex-

hibit of gliding machines, illustrating his experiments, which were the earliest practical studies of dynamic flight in this country, and the precursor of the very important work of the Wright brothers, of Dayton, O., whose recent tests have astonished the world. Professor Langley exhibits his steam and gasoline models, which were the first to fly and balance themselves in the air with automatic control. Dr. Bell sent models and illustrations of the wonderful kites with which he has been experimenting the past three summers in Nova Scotia, including the recently successful tetrahedron kite. Dr. Zahm has forwarded the models and instruments with which he discovered the laws of atmospheric friction, and the hull forms of best shape in the wind tunnel at the Catholic university.

The patent office has been exceedingly liberal and has loaned all its models and patent drawings of aeronautical interest. Mr. Allen, the present commissioner of patents, regards mechanical flight as a rational science, not as a dream to be classed with perpetual motion. Professor Marvin has forwarded from the weather bureau a number of instructive instruments for determining the motion and meteorological conditions of the atmosphere, for it is expected that in this country, as in Europe, meteorology and aeronautics will be mutually helpful. General Greely has shown his sympathy with the movement by lending a number of very interesting appliances, illustrative of the balloon in warfare, but, unfortunately, could not lend his large German kite balloon, having recently shipped it away. Mr. Berlinger, who has made some flying models, and has projected a full-sized aeromobile, is represented by an interesting exhibit. Roy Knabenshue, of Toledo, who occasionally maneuvered over the World's Fair at St. Louis, exhibits the navigable balloons in which he flew about New York city. Baldwin and Karl Myers, America's veteran aeronauts and balloon builders, have also sent exhibits. Leo Stevens shows a 65-foot airship and a balloon.

In marked contrast to the bulky motor balloons is the display of the Wright brothers, showing all the phases of flight of a purely dynamic winged machine, without gas, carrying a man through the air of express train velocities. The brothers Wright were unable to send the new aeroplane, which recently flew 24 miles in 38 minutes.

Motors are shown by the Hendee Mfg. Co., of Springfield, Mass.; the Duryea Power Co., the Curtis Co., and by a 14-year-old lad named George Aden.



PATENT OFFICE AIR-SHIP MODELS IN AERO CLUB'S EXHIBIT

WHAT THE FUTURE MAY BRING

BY C.E. DURYEA



It is far easier to criticise than to suggest. Complaining seems to be more natural than praising, and critics seem to think their ability to criticise is evidence of their superior wisdom. Knowing these facts, I hesitate about criticising, but if some one does not point out the mistakes and show how they may be remedied progress will be made but slowly.

The tendency today seems to be toward a product for ostentation. Automobiles are bigger, more expensive and more showy each year. A year ago the top made its advent. Previous to this automobiles had been good weather rigs. True, a few hard-headed and far-seeing pioneers have been equipping their vehicles with tops for ten or a dozen years, in the belief that an automobile, like a horse-drawn carriage, should be suited for all weathers. People, however, have short memories and those who drive top vehicles forget what it means to be caught in the rain without one, so there are periods when horse vehicles with tops are not stylish and vice versa.

Just now the enclosed vehicle is all the rage. Glass fronts, removable or detachable tops and celluloid or glass all around help to shut the fortunate possessor of a stylish automobile away from his less fortunate neighbor and thus add to the exclusiveness and increased showy effect. What is the use of being able to own an automobile if you cannot impress this fact on your neighbors? The people want it, so the manufacturers supply it and this sounds all right. To a chronic kicker, however, it looks wrong, decidedly wrong. There are undoubtedly buyers who want large, heavy, luxurious rigs, but this class is so small as compared with the great majority who are looking for something to relieve them from the bondage of the horse that it seems like a waste of advertising space and energy chasing a rainbow when real gold can be found by digging in the dirty ground under every one's feet.

The crying need today is a reversal of public opinion—a recognition of the demand that exists—but is absolutely unrecognized for a cheap, light, simple motor buggy. In England there have been a few tri-cars offered; in America a few buckboards or similar under-powered affairs. But taken as a whole the goods displayed at the show, advertised in the papers and seen on the streets are luxuries, not utilities. They are Pullman cars rather than private carriages. They are adapted to the transportation of parties rather than individuals.

Now it may be that this is what the public wants; evidently most manufacturers think so. But if this is the case why is it necessary to give enormous discounts to agents, advertise more extensively than any other product has been advertised and spend great amounts for demonstration? It would seem that if such things are wanted by the public, it would not be difficult to make sales. People buy sugar without its being advertised, do they not?

There are some people who use closed horse-drawn carriages made in the best possible manner with the best possible finish and of from four to six-passenger capacity, but most buggies sold in this country are for two or four passengers, light in weight and priced at about \$100. Most of these vehicles are drawn by single horses. The others are drawn by two horses. The people who buy them frequently have three or four buggies and many horses in their stables. The tendency to increase

horsepower is not visible there, however. The desire to buy something bigger and more showy than one's neighbor can own is not seen as a rule. These facts would seem to indicate that the average man buys a rig because it meets his needs, because it carries him about his business or his pleasure in a simple, comfortable and respectable manner and with little cost for equipment, power or repairs.

Human nature changes little; styles change continually. The style now seems to be "get the most possible for your money." A little longer wheel base, a little wider seat, another cylinder on the engine, an additional lamp or two, a few more gew-gaws on the dashboard and you have reached the acme of style. This is the mark of new things.

Ask the experienced user today what improvement is most needed and he will say better tires. He means well, but he does not know. Good tires have been made all these years, but there is a limit. Rubber and canvas can be worked thus far and no farther. Better tires means lighter vehicles or more wheels. It is surprising that in their attempts to produce something larger than anything heretofore, makers have not turned out vehicles with six or eight wheels. Everybody knows the advantage of increasing the number of wheels under a railroad car and it would seem that greater comfort could be secured, with decreased strain on the tires, in this way rather than by the present method of lengthening the wheel base. Further, a broken wheel under a six-wheeler would not likely result in disaster. It is not likely that such a style will find favor, however, so the cry for better tires, lower cost and cheaper maintenance will doubtless be met by the production of simpler vehicles, and this in turn will come when shows are no longer held in the winter and when automobiles are no longer exhibited indoors like art work, but are shown in motion in the open air as horses are exhibited at a horse fair.

FASHIONS IN MOTOR CAR TOPS

BY J.H. SPRAGUE



What is not known about automobile tops would make a large book. The top industry is still in its swaddling clothes, but it is progressing, like the automobile, whose disappointments and trials and predisposed cussedness have been largely eliminated by the untiring work of such men as Duryea, Olds, Ford, Franklin, Riker, Thomas, Schmidt, Winton and others. So have a few top builders succeeded in forwarding the top industry, until the season of 1906 finds large improvements over the tops of 1902.

The first canopy top for automobiles was a French contraption—crude, unsightly, and as clumsy as the running gears of an old-fashioned Dutch oven. The ponderous deck with its painted stage coach rail supported by ungainly posts, a combination of wood and iron, and the unspeakable window frame, was fearfully and wonderfully made. A man may have been able to understand the intricate working of the crude motor of 1902, but it took a master mechanic to handle the front window of the French-made canopy of those times. The canopy top of 1903 was a long way in advance, and 1904 saw a neat, strong and reliable canopy top that has not been improved upon and probably will not be to any great extent.

But the trade demanded a lighter, if not better, covering for automobiles for 1904. Some cape tops had been made in 1903, but they were non-fitting and ungainly. The old adage of fitting like a shirt on a bean pole was the right definition for the first cape tops, covered with khaki—which is the East Indian name for mud. They were the most disreputable automobile covers that had happened—a travesty on the name of automobile tops. But the car makers of 1905 demanded in the name of their customers, and in justice to the elegant automobiles

they were then producing, something that would add and not detract from the beauty of their cars, hence came the extension top, made somewhat after the lines of the surrey tops that had been in vogue for years. It had to be adapted to its new uses, remodeled and made on lines demanded for automobile use. The stock and material were different; the steel-covered bows that were used on carriage tops were not deemed to be of sufficient strength to withstand the fearful strain of a touring car.

It was demonstrated that second growth ash, well ironed, was the only wood that could be really depended upon, and that a good three-ply whipecord or a heavy rubber duck was about the best cover that would stand and give good wear. Imitation leather of different brands were tried, but the top makers were not wholly satisfied with what most people would call good enough. This season sees a substantial improvement.

Last year's tops were made without regard to folding back very closely over the tonneau. Some makers tried to bulge the wood bows outward on the bottom end, but when so made they could not be induced to retain their places and did not fold back well, giving too much of a brush-heap effect to look well or work well. But Yankee ingenuity is never balked; it is said there is always a way provided for the lame and lazy, and there is always a way out of a mechanical difficulty. The correct bows of 1906 are straight at the bottom end, and the crook required to throw the bows out so as to encircle the back of the tonneau and allow free view to the rear are made of drop forgings or bent steel slats, making the job much neater and stronger and insuring the top to fold back flat, with one bow directly on top of the other, obviating the wear on the cover.

The coverings are gray and buff or black three-ply whipecord, rubber duck, or a good quality of imitation leather. Tops this season will be guaranteed to wear for a year, with certain reasonable restrictions.



distributor or commutator, with four points of contact using the ordinary brush or ball contacts, which, being mounted in the end of the magneto, forms the distributor. The wires are connected from these four points to the spark plugs.

The high tension magneto is somewhat complicated, although considering the work it performs, its construction seems to be simple, the manufacturers evidently having given this point consideration. Of the three methods of ignition there remains the low tension. With the application of this the spark mechanism becomes simple, batteries, coil, commutator and plugs being entirely eliminated. The up-keep of the car is, therefore, evidently reduced; the recharging of batteries is unnecessary, which is an expense; there is no coil to get out of order, no spark plugs to keep clean and replace, no commutator or complicated sets of wires to get out of order. The low tension differs from the high tension in construction, the low tension being the simpler, from the fact that it has no distributor. Practically all there is to it is the arch-curved magnets, shaft and segmental contact mounted upon a suitable base. Its drive is the same as a high tension magneto—by a gear from the camshaft. The magneto is mounted upon the frame or on a bracket built upon side. There is but one wire with the low tension magneto, which is connected to a bus bar on the sides of the cylinders, this being connected with insulated anvils, through which the circuit is made. The movement is actuated by cams and push-rods connected with a camshaft opposite the valve camshaft. When the pushrod rises it brings the cam in contact with an anvil inside the cylinders, causing the current to flow, and as the cam revolves the pushrod drops, under spring pressure, causing a break in the circuit, thereby producing a very hot spark.

Another method of ignition using the low tension magneto—and one deserving notice—is where the make-and-break ignition apparatus is driven by bevel gears mounted on the inlet camshaft, with vertical shafts running in a bearing at the sides of the cylinder near the top. On this shaft is connected an eccentric, which operates a lever upon a small pawl. As the eccentric reaches its maximum throw the pawl is turned, thus throwing a lever away from the spark plug and making the spark. The spark plug in this case is nothing more or less than an insulated plug, with a pin extending to the inside of the cylinder, the top of which is connected with a bus bar, which in turn is connected to the magneto by a single wire, being mounted on the engine case and gear driven. As all parts are well constructed and lubricated there is not much chance for trouble.

There is one bad feature about the magneto. When the armature shaft becomes coated with oil it goes out of commission entirely, and under these conditions the magneto must be taken off and washed with gasoline and thoroughly cleaned. It might be well to state here that the magneto is provided with oil overflow holes, and if these are kept free from oil and dirt considerable inconvenience can be avoided. Some magnetos are practically dirt-proof, being provided with a sort of hood completely covering the magnets, while others are covered by the washers of the car to suit their specifications. With the magneto one feature is to be appreciated—the motor is not dependent upon auxiliary parts for ignition, thereby making the ignition self-contained in the motor.



As the doors of the garden were thrown open for the first show under the auspices of the A. L. A. M., the visitor sees the revival of make-and-break ignition, not heretofore used extensively, however, as indicated by the presence of the battery and the jump spark coil. But why the change? Is the make-and-break superior to the jump spark method? As the former system, as designed for 1906 cars, is far more simple and durable than the same method of earlier days, its superiority must be determined by the demonstrations of the coming seasons.

The electrical apparatus connected with the battery and coil sometimes gives a prospective customer a cold chill, although a little intelligent examination and study will soon simplify matters. By use of battery and coil the motor is made far more simple by reducing the number of running parts. The simplicity of a motor appeals to all.

Some manufacturers have their cars equipped with high tension and some with low tension magnetos. Undoubtedly this discrimination is on the part of designers, some of them presenting views on the low tension magneto which are not in accordance with the views of the engineers, who favor the high tension magneto. In the high tension magneto batteries, coil and the usual commutator are entirely omitted, thus simplifying matters to an appreciable extent. In considering this the spark plug remains the same as with the jump spark system. The secondary current, instead of running directly to the spark plug, runs to the high tension distributor usually constructed on the magneto. The secondary winding is connected with the shaft, which is driven by a gear from the camshaft. For the sake of clearness, the distributor may be considered the same as a





MAIN ARCH AND STATUE AT ENTRANCE TO THE GARDEN

New York, Jan. 15—Looking over the construction features of the cars at the two shows, even in the brief time allotted, there can be only the conclusion that perfection is reached by passing through the complex to the simple. So that while no radical construction departures are to be found, there is a notable development in details, with a unification approaching that point which finally places all lines of manufacturing on their proper pedestals. The most striking condition which presents itself is that both shows bring out the fact that with few exceptions those manufacturers heretofore prominent as exclusive builders of cars with horizontal motors are showing one or more models—in the sense of power—with four vertical cylinders placed forward under a hood. Not only is this true of water-cooled makes, but of air-cooled as well. This being so notable, an examination of construction must be divided, with the condition in mind that two distinct types are in view, with minor variations in each. Further, the two-cycle motor

Tendencies Construction by the New

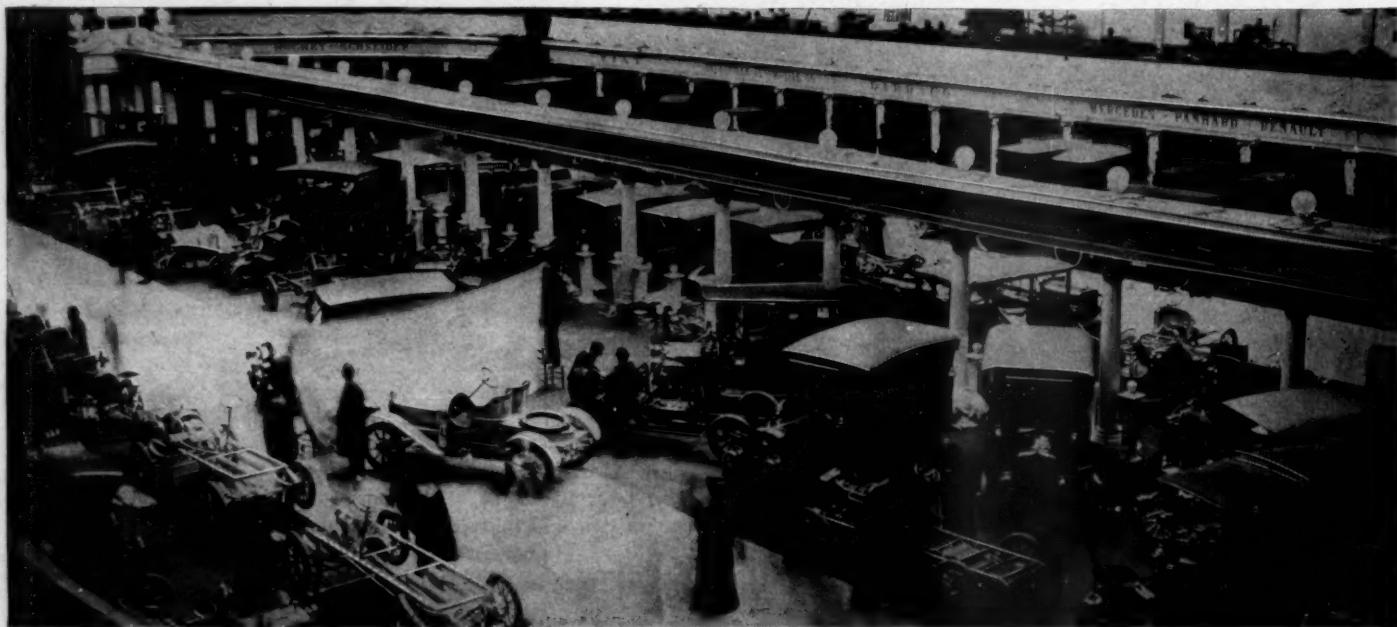
has now been placed in the four-cylinder, and is a factor in the construction of that type.

Broadly speaking, the line of demarcation is in power and its tantamount size of car. There are, of course, to be found large cars with horizontal motors and small cars with vertical motors, and the overlapping conditions are at times confusing unless it be borne in mind or the belief is held to that the four-cylinder engine, of whatever power, engineeringly lends itself to simplicity if made vertical rather than horizontal. Again, it must be remembered that the horizontal motor, either single or double cylinder, has construction advantages in those two units combined with value for the purposes to which they have confined heretofore, light cars and low or medium selling prices.

As much cannot be strictly said for the sliding gear, as in some cases the planetary transmission has been held to, even with the four forward vertical cylinders. These exceptions, however, are so few that it is only by a close adherence to sizing up that the few exceptions are found. For these exceptions it must be said the planetary gear has been so improved that what 2 years ago might have been said against it does not now so well hold true.

In cylinder castings there is the same difference of opinion that exists abroad as to casting singly or in pairs. Each system has its advocates fully primed with reasons, but with the single cylinder casting advocates somewhat in the lead by virtue of numbers. At this moment, the opening of the show, there is to be found but one instance of all cylinders cast together. In this instance the engine has three cylinders and is of a type distinct from all others that in itself rather requires this mode of casting, as it uses the exhaust from two four-cycle cylinders in one cylinder running two-cycle.

Water jackets are generally up to the modern practice of keeping the bottom point of the jacket fairly well up toward the top of the cylinder—in line with the lowest moment of final expansion in the cylinders. Cylinder heads are not so generally

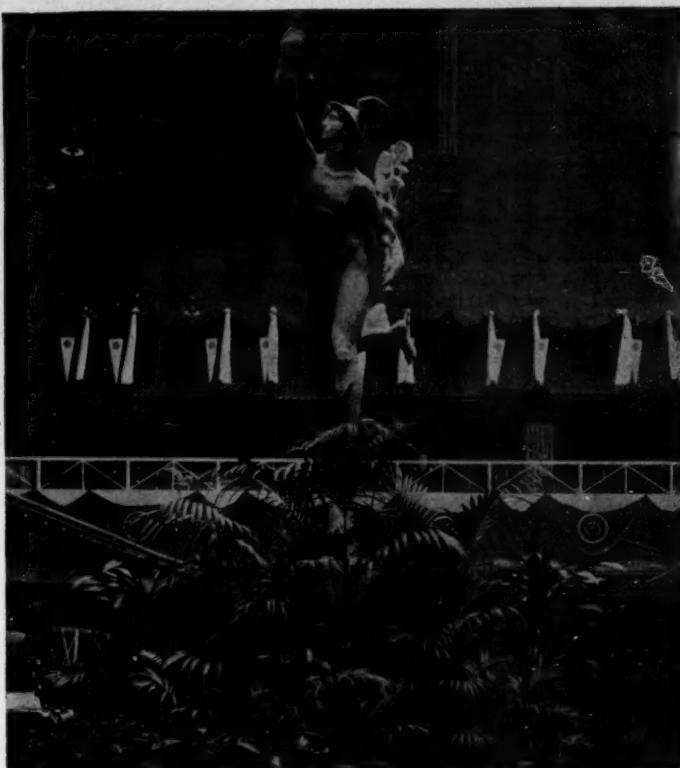


VIEW OF MAIN FLOOR OF THE GARDEN FROM THE TWENTY-SIXTH STREET SIDE, NEAR CENTER OF BUILDING

in Motor Cars as Exemplified York Show

full round as in the past, there being a variation from flatted crowns to dead flat tops. Valve chamber positions seem to be governed largely by car price, the higher priced cars having the valves with exhausts on one side and inlets on the other, while medium priced cars generally have the valves all on one side, the consideration being the cost of two half-speed shafts, their cams, gearing, bearings, housing, etc., with the consequent machining and fitting of all. In either method the valves are all now made for good practice, and not empirically, of the same size. With the valves all on one side the problem of piping is somewhat complex and not always conveniently worked out, this matter of convenience being particularly notable when it comes to the need of lifting the valve spring off its cup—to remove the cotter pin—for a valve removal.

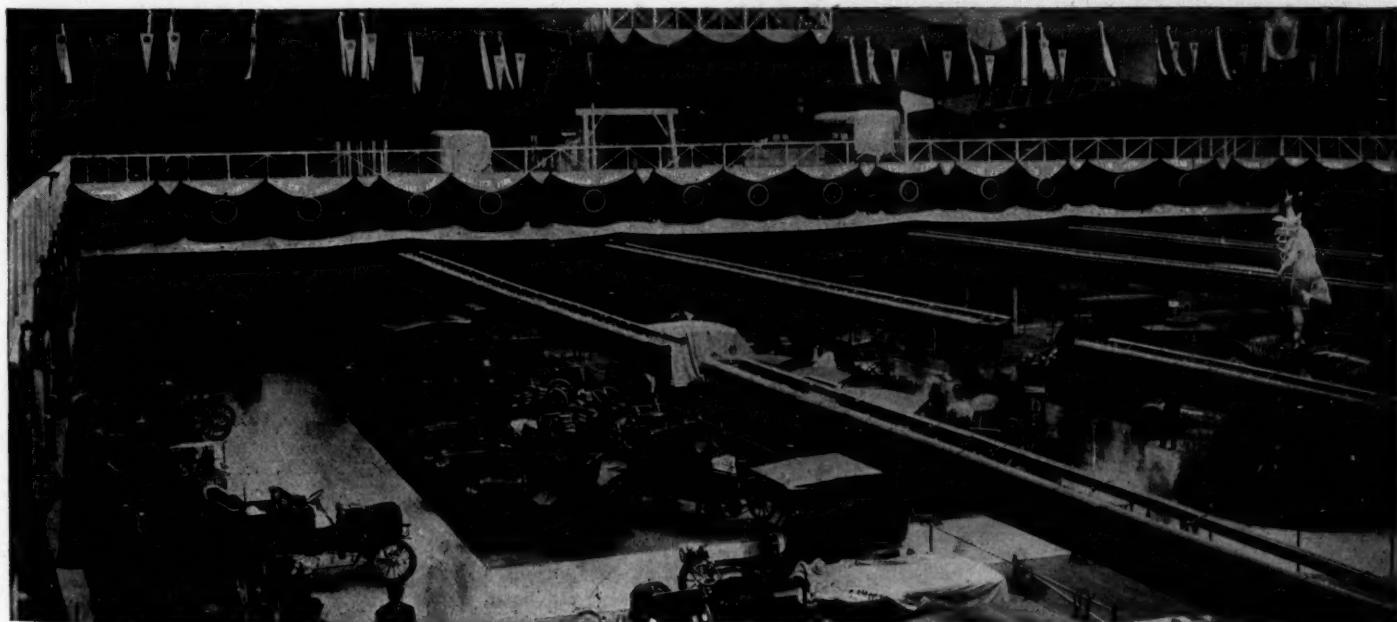
In water-cooled motors the valves are operated by a direct lift from the cam, with the intermediate pushrod and shoe, with only few exceptions. In these exceptions the long outside pushrod is used with cross tappets at the top of the cylinder moving the valves down instead of up. This, of course, gives the at least theoretical value of a direct intake and exhaust without side passages. In practically all the air-cooled motors this tappet valve operation is used. With them it may reduce the super-heating of the incoming gas and also reduce the heating surface to be cooled of the cylinder, as well as simplify the problem of casting the radiating gills. It is not altogether agreed, however, that this method of valve operation does not introduce other conditions, such as more moving parts and the wearing of joints, thus changing the timing, that largely offset the theoretical values. On this question of valves it is found that more attention is being paid to the value of a supplemental or port valve at the bottom of the working stroke on four-cycle engines. The Franklin people, for example, have augmented their valve of this kind by placing a regular poppet exhaust valve at this point, instead of using an open port, and are opening the valve by means of direct lift from the camshaft.



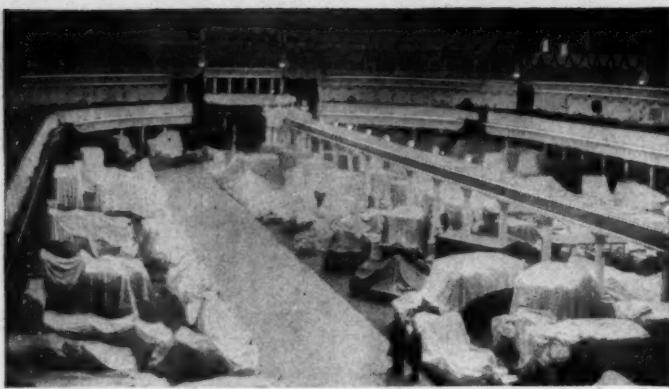
BEAUTIFUL FIGURE OF MERCURY IN CENTER OF THE ARMORY

The crowning of piston heads is more noticeable, and piston rings are practically all made with box-joint overlapping ends instead of with the diagonal butt-joint, so generally used in the past. There seems to be no fixed idea as to a bottom piston ring, a few makers using it. The general rule is three rings toward the top and an oil groove near the bottom.

Casting the engine base so that the camshaft runs shall be divided by a partition from the crankshaft pit is not held to so noticeably as heretofore, the general idea being that without the partition the crankcase splash will take care of the camshafts, thus doing away with additional lubrication feeds and their complexity of troubles. There is also a tendency to make all bearings somewhat longer, and with this to look more closely toward preventing over lubrication and leakage, with consequent heavy exhaust and general uncleanness around the power plant. Combining an oil vent and extra oil supply tube for the crank-



GENERAL VIEW OF HALF OF THE MAIN FLOOR OF THE ARMORY, LOOKING TOWARD LEXINGTON AVENUE



THE GARDEN SHOW IN ITS NIGHT ROBE

case is not so general a feature as could be wished, and when done the tube is apt to be too short for convenience in pouring in oil. By running the vent tube well up toward the engine head, as some do, the screw cap, for checking the oil spray due to crankcase compression, is easily removed and oil readily poured in without outside spilling, when it is deemed desirable to supplement the regular feed.

In any one type the cone clutch leads, the balance of power lying between the multiple disk and the expanding divided rings. In the latter two types, each has a representative following in the effort to give a more progressive and less savage clutch engagement, particularly when the foot of the most experienced—let alone the large number of beginners—slips on the pedal. Pedals, both for the clutch and the shaft brake, are now moved forward rather than down, the leverage being easier on the ankles of the operator.

Transmissions have sliding gears on the four-cylinder cars, with two or three exceptions, where planetary gears are used, although in one case, where a large planetary gear was used last year, the same maker this year has gone over to a sliding gear. Up to medium powered cars three speeds rule, beyond this four speeds ahead is general, all, of course, having a reverse. Direct drive on high is everywhere and a throw-out for the idle gears is more noticeable this year. In three-speed transmissions the sliding gear is usually operated with but one yoke rod, the oper-

ating lever at the side of the car working over a notched quadrant. With four-speed transmissions two yokes are generally used with selective yoke—push—rods, the operating lever at the side working through a gate quadrant. In the latter type it is possible to go up two speeds without passing through the intermediate and there is always a neutral between any two gear changes. It is general this year to find that each gear position is locked against accidental slipping of the lever on or in the quadrant.

While not so general as in foreign cars, the placing of a pan under or around the engine and transmission is certainly coming into vogue among American makers. That it is not more generally fitted is due to a feeling on the part of some makers and many chauffeurs that it is not an altogether unmixed blessing. This feeling is probably traceable to that sort of pan which scooped under the power plant, needing a contortionist to get at anything that fell into it. With the type now coming to the front, placing the pan across in a fairly straight line to the frame sides, the objection is seemingly removed.

Water circulation is altogether by geared pumps and practically in all cases the supply is confined to the amount carried in the cooler, a number of makers building the cooler with an extra tank section—as a part of the whole—doing away with a supplemental tank, as of old. Water piping continues to be straight through in size with little if any attempt at increasing the area as it progresses toward the discharge end. Coolers, or radiators, are preponderately cellular with the variations of cross tubes, both large and small in diameter, and a design with gilled upright tubes of small diameter. Fans are now general and there is an increasing tendency to make them with a rim at the outer ends of the blades.

The bonnet fronts of many of the air-cooled engines have gone away from the mere grill or screen effect to the cellular appearance familiar from association with water-cooled motors. In fact, in these instances it is impossible to tell that the motor is air-cooled by judging from the bonnet front or air screen. This imitation is not mere flattery to water-cooled cars, per se, but is carried out because those who use it recognize in the cellular type of water-cooler good design to the eye. Air-cooled engines with exposed cylinders and open fan and with hooded-in cylinders and forced draft by encased fan or blower, as well as two-cycle engines, find added exponents among the exhibitors, but that type of motor looked forward to by not a few, a two-cycle, air-cooled, with cylinders hooded and forced draft, has not yet made its appearance.

Oiling by mechanical means has become a standard. The position of the lubricator is divided between alongside the engine and on the dash, with the latter position in the majority. Sight feeds are general with regulation possible while running.

In carbureters, simplicity in construction is prominently evident in comparison with the past, and practically all are now made with automatic air inlets working in proportion to the speed of the engine. A convenient detail, not so general as it is noticeable for its value, is here and there found, in some means for priming the carburetor without lifting the hood. The position and exact means differ according to the designer's ideas as to handiness, based somewhat but not entirely on the location of the carburetor. In some cases it is at the lower end of the dashboard, but more frequently and most convenient is the location at the front of the car near the starting handle. If there are any carburetors or their feed pipes that have a supplemental set of air ports to allow for direct air to the cylinder, cutting off the gasoline jet feed, for scavenging during coasting periods, their users or makers have failed to call attention to this feature; nor is it evident from observations that are necessarily made under the severe conditions of exhibits surrounded by people in swarms.

Ignition systems divide at price, the higher priced cars generally using either low or high tension magnetos, with the former in the lead, and the medium-priced, jump spark with plug. In both systems there is a notable improvement in the scheme of disposing of the wires and in running them as direct as pos-



TAKING THE EXHIBITS INTO THE ARMORY SHOW

sible, keeping them taut between throughout their leads. The old method, or rather lack of method, of running the wires alongside the frame or hanging them loosely in any position they might assume, has entirely disappeared, giving place to the better and more ship-shape systems of cleats and bridges, the latter being used for the leads to the plugs, the wires making a straight drop to their particular plug. A convenience to the operator is also noticed, in rare cases, however, the Waltham-Orient being the first to be found, in a simple attachment at the high tension wire end, near the plug. It consists of an insulated sleeve, about $1\frac{1}{2}$ -inch long, surrounding the wire. To those who have tested out a circuit by removing the wire from the plug and forming a gap for the jump, this little fitting looks a big thing, remembering the troubles they have had to prevent a shock through leaky insulation. Four-part coils with individual vibrators are general, although there is to be noted now and then a distributor for a one-vibrator coil. All coils are now equipped with a switch, but the voltmeter attachment and its button are confined to the foreign-made coils found on American-made cars.

Steering columns have more rake, giving greater comfort in handling the wheel, particularly on long rides. A tendency rather than a standard, and one that an operator likes to note, is increased number of makers that have brought the throttle and spark control levers from below the wheel, on the steering column, to a position above the wheel and operating over a longer segment. Not only does this change bring them to a more convenient position for operating, but it gives a wider arc of movement, meaning a more sensitive control.

Frame sides are now all pressed steel—even the low-priced and horizontal motor runabouts having them to a degree that is notable. Cambered fronts are so general that a straight-through side presents an odd appearance. The here-and-there European practice of welding the frame into one piece is not found in American cars and there is a well-formed doubt that the scheme presents any material value, being looked upon as a novelty with more sound than substance. That other European frame-side scheme of arching the rear portion up to give clearance or down to give a lower side entrance is not to be found, the condition being seemingly due more to a lack on the part of the pressed steel frame makers than to a lack of recognition of its value on the part of the makers of cars. Sub-frames are not so general as in the past, crankcase feet being extended to reach to the cambered side frames.

Driving by propeller shaft is the standard up to the larger powers, when double side chain drive is used. This is the one exception necessary to prove the rule, where an option is given on a make of car that shows nothing larger than a 16-horsepower engine.

On the subject of bearings it can be set down as an all-round proposition that the cars shown have ball bearings on the front wheels, roller bearings on rear live axles, with ball thrusts at the differential. Engines all have plain bearings, but there is a division when it comes to transmissions. While plain bearings are the rule, there are not a few cars having non-adjustable ball bearings and some instances of roller bearings. The tendency in this respect is not to take the experiences of others as irrefutable, but to work out a trial on the part of each maker. There is an admission, however, and it is general, that where price warrants it some sort of a non-friction bearing, preferably ball, will be pretty well general in transmission cases by next show time.

Curved or flat dashes rule according to last year's tendencies, makers of complete cars generally keeping to the latter, while assemblers run to the former.

Foot brakes continue as contracting bands, but more than before acting both ways on the drive shaft, while the rear hub emergency brakes are getting away from the double acting band to the internal expanding ring type and in larger proportions than at previous shows.

Springs are also longer, have more leaves and are in many cases full elliptical at the back. The longer springs are coincident with longer wheel bases, giving bodies with more room



UNCRATING A BIG LIMOUSINE FRESH FROM PARIS

and luxury to the tonneau. Tonneau seats are wider by some inches, making the seating of three at the back far more comfortable. Individual fronts continue, but the partition is kept lower and rather less projecting. The proper hangings of front doors is yet an open question as far as conditions at the show indicate, whether to bring forward or back being the dividing point. Front hinged advocates have the argument that if the door is left open or unlatches, the forward movement of the car tends to throw on the latch. The doors themselves now present the proper relative appearance in width, the longer chassis doing away with the cut-and-fit look that was so obviously necessary last year.

Tops, where detachable, are all cape cart extensions, the canopy top only appearing where the rear is closed in with glass with narrow panels at the sides of the rear seat.

The wide-flaring front mud guards remain, but the long, forwardly curving sweep of the rear guards to the front seat steps has disappeared, owing to the longer chassis and proper side door width. With this condition has come the running board connecting the two sets of guards, the lower end of the rear guard following the circle of the wheel. This construction has another advantage in that it does away with the rattle, shake and working loose of the guards so prevalent in the past. Not so general as the construction warrants, yet noticeable from numbers, as well as from the excellence of the idea, is the carrying of the inner edge of guards in and down to the frame sides.



LATE ARRIVALS AT THE GARDEN BACK DOOR

HISTORY of the NEW YORK SHOW

There have been ten automobile shows held in New York city during the last 8 years, including the two now in progress. Of these, two were held in 1899, one each in 1901, '02, '03 and '04, and two each in 1905 and '06. Strictly speaking, the first show, in January, 1899, was not an automobile show. It was the last of the old bicycle shows, and by virtue of the fact that about eight manufacturers had made application for space to exhibit automobiles, the Madison Square Garden Co., which ran the cycle show, unaided, had added the words, "And Automobile," to the "Annual Bicycle Show," under which name the exhibition had always been billed. Among these eight exhibitors were A. L. Riker, the Woods company, and Foster of Syracuse.

The Madison Square Garden Co. had not taken the automobile situation seriously and had merely admitted the automobile people to fill the space, which at that time was less in demand than it had been during the hey-dey of the bicycle game. J. C. Young, at that time assistant secretary of the Madison Square Garden Co., and then, as ever, the moving spirit in the active executive work of the garden, under Frank Sanger, then secretary, happened to be looking at the bicycle show from one of the executive boxes, when he remarked the fact that the greater portion of the crowd was about the automobile exhibits. The bicycle booths seem to be deserted. Mr. Young said that at that very minute the idea struck him that it would be a good thing to hold an automobile show. He stepped from the box and going into Mr. Sanger's office, sprung the proposition on him on the spot.

"Nonsense," said Mr. Sanger, "the time for automobile shows will not arrive for 5 years yet."

"I think the time has arrived," replied Mr. Young. "There will be no chance of holding another bicycle show, and I believe we are going to do better by getting into this automobile game early, even if we lose money on the first and second shows."

Mr. Sanger continued to take a pessimistic view of the situation and the matter was dropped for the day. About a week after A. L. Barber walked into the office of Mr. Sanger, and said:

"Can I get the garden for next week?"

"What for?" asked Mr. Sanger.

"For an automobile show," said Mr. Barber. The garden was not available, but Mr. Young used Mr. Barber's application as a club to further interest Mr. Sanger in the project. A little later came an application from Messrs. Shattuck & Bostwick, as a committee appointed by the Automobile Club of America, for a rental of the garden for an automobile show in the fall of the same year, 1899. Armed with this application, Mr. Young again sought Mr. Sanger, and found with him the late Frank Sturges, then president of the garden company. There was a debate of about an hour, Mr. Sanger still holding that it was too early to exploit automobiles, and Mr. Young fighting for a chance to demonstrate the contrary. Mr. Sturges finally said he and Mr. Sanger would talk the thing over, and Mr. Young left them alone for an hour, at the end of which time they announced that Mr. Young might go ahead.

The arrangement was made with the Automobile Club of America by which they were to secure the exhibitors and receive a share of the profits. The date was set for October of the same year, 1899. When the time came for the receipt of applications the automobile club delivered comparatively few of these and Mr. Sanger felt that the proposition was a failure. Mr. Young, however, persisted in being allowed to see what

he could do on his own hook, and he succeeded in about 2 weeks in interesting enough more exhibitors to fill the amphitheatre of the garden, and the gallery on one side.

This show, in the fall of 1899, the first real automobile show, though the second at which automobiles had been exhibited, was a success from the opening. About \$9,000 was taken in at the gate. In fact, there has never been a loss in connection with the automobile shows held in New York, excepting the importers' salon of last year held in the top floor of the Macy building, and it is doubtful if this would have been a failure financially had the expenditures for decorations, etc., been less extensive.

This first show having, in the fall of 1899, rendered it unnecessary to hold a show in 1900, the next season's exhibition was set for January, 1901. The third week of the year was decided upon and has been adhered to ever since. In this connection it is important to state, in view of the many propositions that have been made for earlier shows, that neither the Madison Square Garden Co. nor the show committee of the A. L. A. M., according to opinions expressed last week by their representatives, believe that a system of earlier shows will ever prevail, as long as Madison Square garden is used as the show place.

At this show, in January, 1901, known as the second show, there were many applications, but when the time came for the signing of the contracts, these were missing. Mr. Young investigated and found that the newly-formed National Association of Automobile Manufacturers felt hurt at the situation and thought it ought to be counted in on the game. To make the story brief, the N. A. A. M. was counted in on the game, and became a more important factor than the club in the promulgation of the shows. In the show of January, 1902, a contract was drawn with the National association entirely cutting out the Automobile Club of America, because there was a lack of harmony between the club and manufacturers' association as to the division of profits. This contract was kept on ice pending a settlement of the difficulties, and on the last day of grace the association and club came together and arranged things on a satisfactory basis.

Following this came the triple agreement between the Madison Square Garden Co., the N. A. A. M. and the A. C. A., under which shows were held up to and including last year.

It is not generally known that the original proposition of last year was to hold two shows at Madison Square garden, one for the Licensed association and one for other exhibitors. This grew out of the fact that the garden had proved itself to be altogether too small to accommodate the rush of applicants for space. It was with this plan in view that the Gordian knot was cut, and the arrangement with the A. L. A. M. was made. But as the Madison Square garden people and the automobile club authorities failed to come to an understanding, the second show, as a garden feature, was cut out.

Relative to the claim made by the automobile club that the present show in the Sixty-ninth regiment armory is in the line of apostolic succession, and should be known as the national show, there would seem to be a technical basis for this statement, as the club has actually been connected with the shows from the first. The Madison Square garden people, however, hold that the succession falls with them, and that the licensed show is the only real, simon-pure national show. As a matter of fact, the two shows now in progress are branches of the same stem, and to disparage the standing of either would be a wholly gratuitous proceeding on the part of critics.

RAIN FAILS TO KEEP CROWD AWAY

New York, Jan. 16—Special telegram—Two miserable days of rain and mist have utterly failed to put a damper on the wild hurrah of success which has characterized the show since the marvelous enthusiasm for the automobile indicated by the quadruple record-breaking attendance the first night at both buildings. With the opening of the doors at 9 o'clock in the morning not only have the dealers but the general public swarmed in. In the forenoon the crowd has been really large, according to past attendance standards for any old hour of the day. In the afternoon the aisles have swarmed with people and the exhibits have been closely surrounded. At night it has been a case of pack, jam, push, a big crowd at all hours varying with the human flow back and forth between the garden and the armory. Saturday night's boxoffice at the garden shows double the attendance of last year's opening. In view of all this, optimism, backed by vacant territory eagerly snapped up and sale after sale to individual buyers, has run rampant. Agents are increasing their orders. Long lines of demonstrating cars are backed up to the curbs on three sides of both the armory and garden, and despite the rain and mud, the going and coming all down the line has been constant. There is no doubt of there being a bigger motor car boom on than even the most optimistic have dared to hope for. Even in the daylight hours the beautiful effect of the garden scheme of decoration is but little lessened. New Yorkers are naturally swelled with pride, but Sam Miles is here and promises Chicago shall not be far behind when it comes to decorations. A whole bunch of delayed cars arrived at the armory yesterday and cars are still coming in. The consensus of opinion at the close of the afternoon session Tuesday was that the greatest success had been made by the garden show, with the armory show a remarkable second and both show ages in advance of anything previously held. Professor Graham Bell with his kites, Leo Stevens, the aeronaut, and other experts who have arrived at the Aero club exhibit at the armory, pronounce that display the first real exposition of the character ever held, at least in this country.

Show Packed to Overflowing Day and Night—Ford Runabout Proves a Veritable Sensation

New York, Jan. 16—Special telegram—The Ford four-cylinder runabout made its appearance in the armory today and from that time it was impossible to get near it owing to the crowd. People were so thick chance to see the car that a MOTOR AGE representative hunted up Henry Ford and stood on top of the six-cylinder car to get details. Just after starting on details, the machine was hoisted on to high blocks and the MOTOR AGE man crawled under the car to get more. People were fighting, photographers could not get near, the crowds would not stand back, everybody was questioning everybody else. Mr. Ford when interviewed said: "I have driven cars as much as any man in America, and I built this car to suit myself and according to the design I think a car should have. About 1½ years ago the idea of putting out a four-cylinder runabout came to me and since then I have been at it day and night to make good." Just then an outsider shouted out in lusty tones: "You have made good." Good judges who have talked to MOTOR AGE men back up the statement made by Mr. Ford. This is as follows: "I believe I am an average man and that this car distinctly fills the wants of just such men. In making it I have kept the idea of that want and backed up the construction with my experience as an automobile builder."

The Baby Reo, mounted on its exhibition table, is always surrounded and the number of children who have sat in it and found out how it works is large. But the children are not the only ones. The doubting Thomas is ever on hand. He thinks the motor will not go and that the steering gear is a myth. But before leaving he discovers that a turn of the steering wheel turns the front wheels, that the motor will go and that the brakes are real.

There is great rivalry between the two shows in the matter of getting society in line as star guests. Up to date the shows have divided the patronage of the 400 pretty evenly. Both press agents are working overtime recording the attendance of multi-millionaires and society leaders, interspersed with a few titled personages and others interested in automobiling and automobiles.

MOTOR CAR DESIGN AS EXEMPLIFIED BY THE NEW YORK SHOWS

THE MOTORS WERE:

	1906	1905	1904
Water-Cooled.....	246	181	156
Air-Cooled.....	40	25	29
Both.....	0	1	0
Four-Cycle.....	228	203	181
Two-Cycle.....	4	2	3
Compound.....	4	2	1
Four-Cylinder Vertical.....	201	127	82
Double Opposed.....	48	39	41
Two-Cylinder Vertical	14	12	17
One-Cylinder Horizontal.....	10	9	25
One-Cylinder Vertical.....	1	8	14
Three-Cylinder Vertical.....	5	5	5
Three-Cylinder Oblique	3	2	1
Twin-Cylinder Horizontal	0	2	0
Six-Cylinder Vertical	3	2	0
Four-Cylinder Horizontal.....	1	1	0
Jump Spark Ignition.....	257	188	158
Make and Break.....	31	19	21
Both.....	4	0	6
Ignition, Batteries.....	233	157
Ignition, Dynamos.....	42	31
Both	11	19

CLASSES OF CARS

	1906	1905	1904
Machine Displayed.....	437	267	258
Gasoline Cars	335	207	185
Electric Cars.....	34	20	45
Steam Cars	9	9	9
Electric Trucks.....	24	9	7
Gasoline Commercial Cars.....	24	7	5
Motor Bicycles.....	11	15	7

THE GASOLINE CARS CONSISTED OF:

	1906	1905	1904
Chassis	71	37	33
Open Tonneau	145	81	66
Open Tonneau, Side Entrance	148	66
Open Tonneau, Back Entrance	0	15
Tonneau with Tops	49	30	35
Runabouts and Miscellaneous	65	30	35
Limousines	27	20	11
Surreys.....	3	9	5

INCLUDING IMPORTED CARS

	1906	1905	1904
Total Cars, including Chassis.....	508	348	258
Gasoline Cars	345	288	185
Water-Cooled Motors	303	256	156
Air-Cooled Motors	40	30	29
Both	0	2
Four-Cylinder Vertical Motors.....	255	208	82

	1906	1905	1904
Jump Spark Ignition.....	254	233	158
Make-and-Break Ignition.....	75	36	21
Both	14	19	6
Ignition, Batteries.....	235	174
Ignition, Dynamos.....	87	60
Both	21	54

HOT AS OTHERS ARE MADE

Some of the Features of Construction

How Radius Rods Are Used

A most noticeable novelty in radius rod design is exemplified in the light air-cooled Logan runabout, in which the drive to the live axle is by a single central chain. Full elliptic springs are used throughout. The radius rods are attached to the front end of the rear springs, the end of the rod being yoked. The yoke arms spanning the spring end receive the end bolt of the spring, made extra long for the purpose. The front end of the rod is pivoted to a short bracket beneath the frame. Right and left turnbuckle adjustment is used. In the larger Logan models a combination radius and truss rod support is used. Beneath the center of each side frame piece is supported an irregular square-shaped bracket. To the opposite lower corners of this bracket are pivoted radius rods to the front and rear axles, the one to the rear being pivoted to the front of the spring seating and the forward rod pivoted at a point higher than the axle. Two truss rods, for supporting the frame side pieces, are fastened to the bracket nearer the top. Besides serving as an attachment for these rods, the bracket further serves as a bearing for the crank-shaft, which is carried crosswise of the car at this point. As the sprocket for chain drive is mounted loosely on this shaft, the radius rods act directly in line between the axes of the sprockets on which the chain runs.

In the Jackson model C, a two-cylinder machine with the cylinders placed horizontally beneath the center of the body, chain drive is used and semi-elliptic springs are fitted in the rear. The forward end of the radius rod on each side pivots to the bottom of the spring hanger, which is made with a special curved horn to receive it. The rear end of the rod is fastened to the spring seating on the axle. The crankshaft, carrying loosely on it the sprocket for chain drive, is some distance in advance of the spring hanger, so the rod does not act directly in a line between the axes of the sprockets over which the chain travels.

In the Reo runabout rather short radius rods are used. As usual they are secured to the spring seating on the back axle and in front end in a ball-joint fitting into a split socket in the bottom of a bracket on the under side of the frame. By splitting the bracket the rod can easily be taken out. Turnbuckle adjustment is used.

In the Glide cars the subframe supporting the motor and gear set is supported in the rear by quarter elliptic spring leaves bolted to the ends of the subframe and having a pivotal connection with the back axle casing. Regular elliptic springs carry the main frame. To the back axle casing is pinched a clip, the front

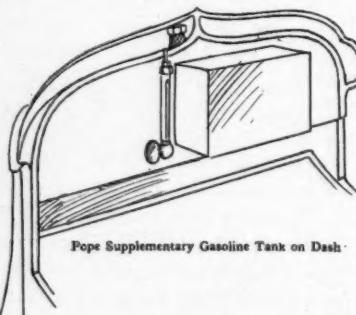
of which carries a lug for receiving the radius rod. Resting on the top of the clip is a crosswise hinge carrying a small swinging platform. Resting on this platform is the end of the subframe spring and over the spring is the flattened end of a rocker arm which has a bearing above the center of the elliptic spring. This rocker is free to rotate as the subframe is depressed without rotatory strain on the axle housing. This pivoting of the subframe allows a limited front and rear movement of the axle housing without influence on the subframe. The torsion rod is replaced by a short lever secured to the sprocket cage and with its front end linked to a clip on an arched frame piece of the chassis.

Unique Torsion Schemes

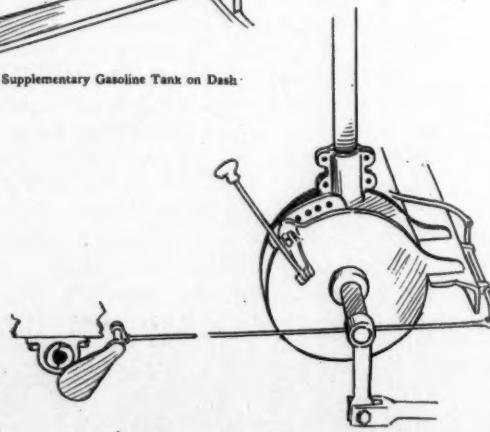
In the Glide touring car shaft drive is used, but a torsion rod is dispensed with by having a housing for the cardan shaft. The shaft housing is carried at its forward end in a large bronze housing, carried through a pair of trunnions from a cross piece of the frame. This casing is split lengthwise in the center, and has a sliding fit with the cardan shaft housing, so all rises and falls of the body occasioned by the springs are taken up this way. Within the bronze housing a Spicer universal joint connects the shaft from the gear box with the cardan shaft and the axes of the joint are in line with the trunnions carrying the casing housing. From either side of the casing, just in rear of the trunnion supports, are attached two diverging brace arms that connect with the outer ends of the back axle housing.

The new Stoddard-Dayton touring car is another machine in which the use of a torsion rod supporting the cardan shaft is dispensed with and its place taken by a housing enclosing the shaft. Nothing out of the ordinary is met in the rear end construction of the shaft and its housing other than that the shaft is carried on roller bearings within the housing as it is at the forward end.

The front end of the housing is enlarged and takes the form of a drum partly enclosing the universal joint of the shaft. This housing expansion is supported in a ring, the outer surface of which is part spherical, and is carried in a similarly shaped socket made in halves clamped together and the top half fitted with a bracket part, by which it is bolted to cross piece of the chassis frame. Having the cardan shaft casing carried in a partly spherical ring and the ring in turn supported in partly spherical-shaped sockets, a joint is made having all of the merits of a ball and socket joint as well as a slip joint, the shaft housing being able to slip in the ring. The ring being



Pope Supplementary Gasoline Tank on Dash.



Buick Anti-Kick Device and Tilting Column

a ball, can easily roll within the outer sockets of the device.

Still another devotee of the housed cardan shaft is the Jeffery company, with its new four-cylinder, shaft-driven Rambler, in which a torsion rod is not used but a couple of diverging brace arms from the front of the shaft housing to the spring seatings of the axle, share the strain of the housing. In this machine full elliptic springs are used in the rear, and the tops of them are pivoted to the main frame sidepieces. The rear end of the steel cardan shaft housing threads into a steel flange, the flange in turn being bolted to the differential housing, whereas the front end of the housing enters a funnel-shaped expansion, shown in the illustration, and which has trunnions on either side which take their support from two dropping arms on the frame cross piece. Instead of the shaft housing being screwed into the funnel expansion it is made with a flange on its forward end and a nut and thread behind the flange. The shaft casing is then slipped through the funnel part from front to rear and the nut tightened, holding the housing between it and the flange. As the springs are depressed and the propeller shaft brought more nearly horizontal, the back axle is forced to the rear and the springs slightly tilted. The brace rods have a ball and socket connection with the sides of the funnel expansion, which acts as a housing for the universal joint in the shaft, which joint, by the way, is placed so that its axes are in line with the trunnions axes carrying the housing.

Auxiliary Gasoline Feeds

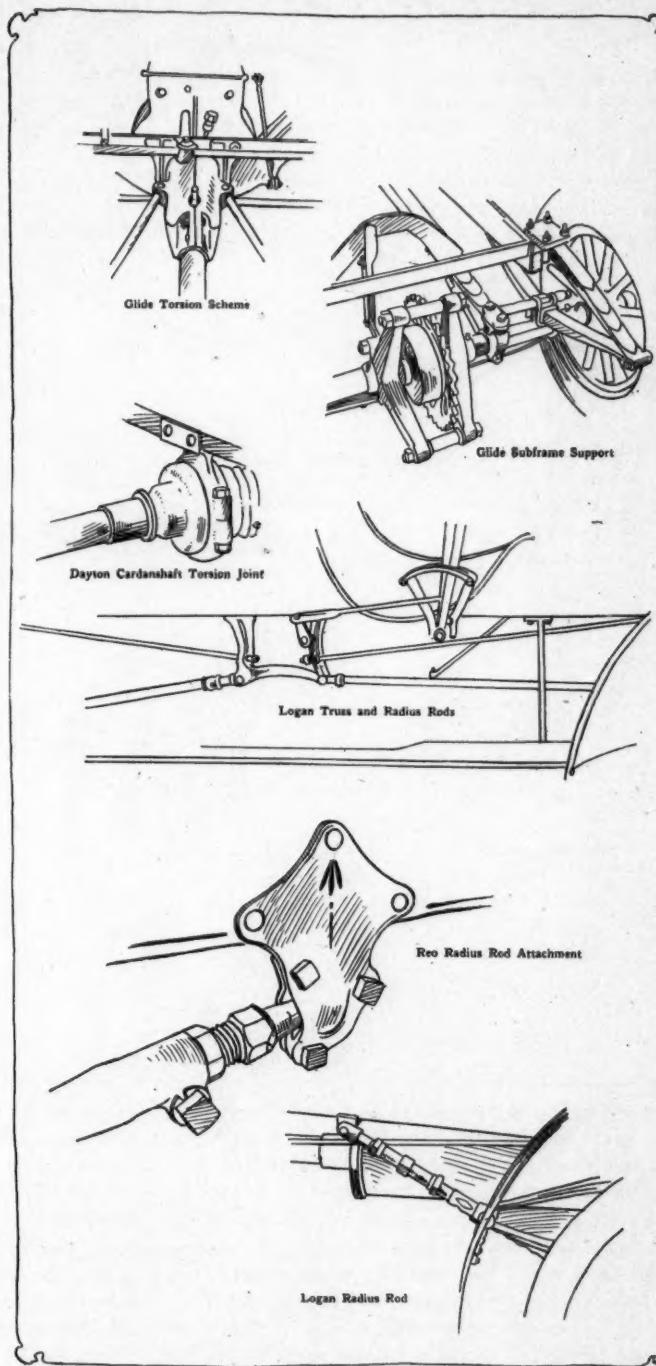
Among the many changes on the new 35-40-horsepower Pope-Toledo car must be noted the new method of gravity feed of gasoline to the carburetor. Two gasoline tanks are used, one of very large capacity, termed the storage tank, located beneath the chassis frame in the rear, and the other with capacity for 75 miles, and known as the running tank, is carried in the top half of the hollow metal dash. On the tank within the dash is a glass gauge showing the amount of fuel within it. An air pump is used in forcing gasoline from the large storage tank to that on the dash. This pump is placed vertically between the front seats and is worked by hand, a few strokes being sufficient to place enough pressure in an air tank, carried on the chassis frame, to force the fuel from the storage tank to the other. A controlling valve is placed in front of the seat and after the pressure in the air tank is 10 pounds to the inch, this tap can be turned and the running tank filled. By use of this same air-pressure tank the oiler carried on the motor case can be filled from a storage oil tank at the side of the chassis, a controlling valve for the oil being placed beneath the front seats. Having the running gasoline tank occupying only the top half of the dash, there is sufficient foot room left at the bottom.

In Winton model K, a small running gasoline tank is carried on the dash, from which the gasoline feeds by gravity to the carburetor. The air pump on the front of the cylinder, which supplies the air pressure for regulating the intake valves, also furnishes the supply of air pressure for forcing the gasoline from the large storage gasoline tank carried beneath the rear of the chassis frame to the small dash tank.

Back Kick Preventives

A neat and simple preventive of back kicking when cranking a motor is fitted to the horizontal motors shown by the Buick concern. The motor is cranked from the side, the crankshaft resting in a bracket beneath the side pieces of the vehicle frame but not extending outside of the bracket. In front of this bracket is pivoted a cam-shaped plate which is connected with the spark advance lever on the steering wheel, so that when the spark is retarded the cam plate hangs as shown in the illustration, but with advancing the spark the cam plate is raised, covering the end of the bracket carrying the crank-shaft, and so preventing the starting crank being inserted. Should the starting crank be inserted and then the driver attempt to advance the spark he finds he cannot, as the cam plate will strike against the starting crank and he cannot move his spark advance lever. Thus the device is double-acting, work-

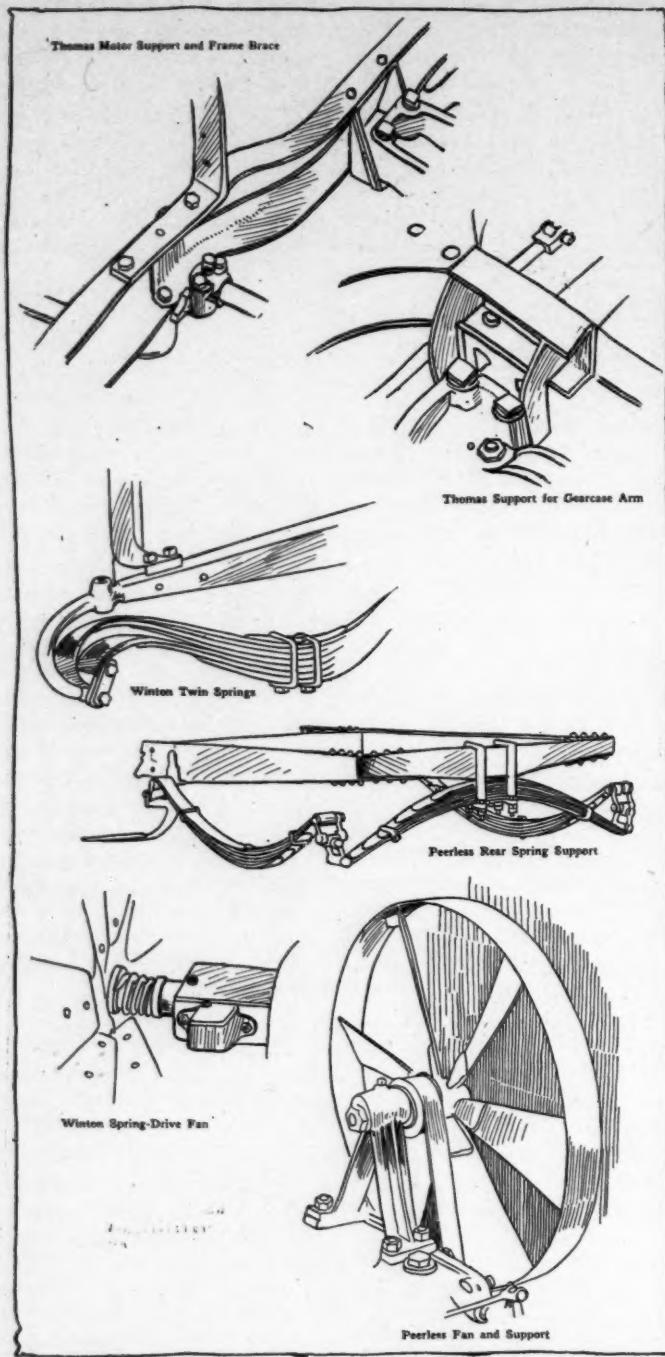
ing equally well whether the starting crank is inserted before the spark is shifted or vice versa. Another novelty shown in the same illustration is the Buick tilting steering column. The steering gear is enclosed within a short, drum-like, oil-tight casing, from the outer end of which extends the axis that connects by a short lever with the steering knuckle connections. The gear case is carried between a pair of circular plates, each carried on a frame cross piece in front by two short arms. In the top of these plates is a series of holes corresponding with a similar series in the steering gear drum, and in the outer plate is



a short draw bolt that locks the gearing drum to the plates. The bolt can be withdrawn by a push button in the car floor and the gearing drum tilted to any desired angle. The bolt released enters the hole, locking the drum with the plates.

Rack and Pinion for Gear Shifter

The accepted style of shifting rods for moving the sliding gears in a gear case is replaced in the Pope-Hartford four-cylinder car by a rack and pinion scheme. The bottom of the change speed lever links with a downward arm on a toothed



sector, which is carried on a shaft extending from the side of the gear case. This sector meshes with a pinion on the outer end of another shaft which enters the gear box and carries a similar pinion on its inner end. This inner pinion meshes with a horizontal sliding rack in the bottom of the side of the gear case. To the rack is secured a yoke spanning the sleeve uniting the two shifting gears. The shifting rack works with a guide in the bottom of the gear case. The design gives a positive shifting control over the gears, and is not in the way when inspecting gears, occupying as it does little room in the side of the case.

Keeps Mud Away

Several attempts are made in the new machines at preventing the throwing of mud between the inside of the fenders and the body by the front wheels. The Franklin company has a mud guard for the front wheels which is of ordinary size but which is enclosed at the inner side by a web of metal, secured at its top part to the inside of the fender and attached and supported from the frame work at the bottom. The bottom lines of the metal sheets follow the form of the tire and are slightly cut away in front.

In the big Pope-Toledo car the front fenders are very large but the rear pair small and made to follow the contour of the wheels. They are further adapted to prevent mud throwing by being slightly arched from side to side, thereby fitting more closely around the arch of the tire. Between the running boards and the car body is inserted a long patent leather mud apron, tightly buttoned at one side to the frame piece of the car and at the other side to the edge of the running board. Both of these features, with the flaring front fenders, make a good anti-mud combination.

On a few other models exhibited by other concerns the front fenders are made flat on top and very wide, with short dropping flanges on either side of the fender, giving it a shallow, box-like effect, in which the outer part of the tire is enclosed. A few others show sheet iron aprons between the frame pieces and the running board. One concern fills this intervening space with the doors of baggage lockers that are carried beneath the car for the convenience of tourists.

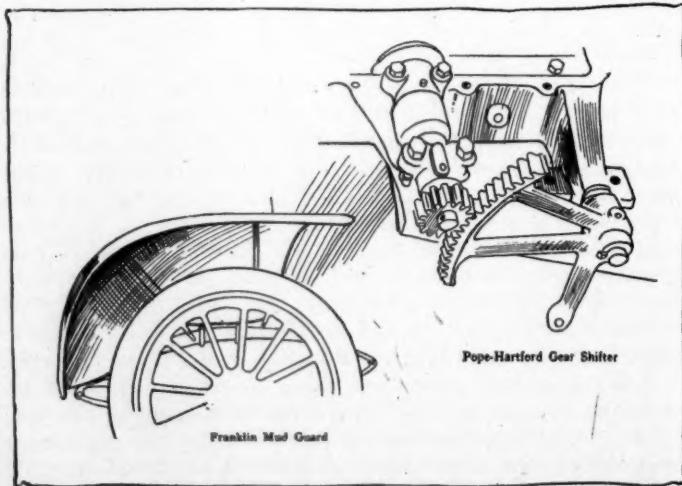
Thomas' Power Plant Support

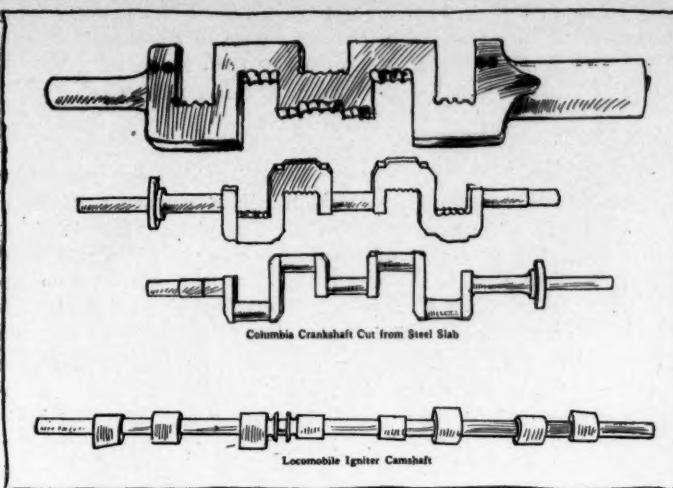
In the new Thomas car are many features out of the ordinary, many of which are referred to elsewhere, but in this connection reference must be made to the method of supporting the motor and gear case arms on the channel sections of the main frame. The frame is insweped alongside of the motor and by way of strengthening it at this point a channel piece of slightly smaller section than that of the frame pieces is fitted within the latter and bolted thereto. This reinforcing piece has a double depth of channel at the offset, the extra depth serving as a brace across the bent portion of the main pieces. In carrying the motor on the side pieces direct, rather than have the motor arms rest within the channel pieces, the maker places metal boxes between the channels. A dropped part of this box nearer to the motor than the channel webs acts as a bed in which the motor arms rest, and are bolted thereto. Similar support boxes serve in carrying the front end of the gear box on a main frame cross piece except that in these boxes the step parts forming the bed for the gear case arms are more heavily dropped.

A Variety in Springs

Among the many innovations seen on the new Peerless machine the rear platform spring suspension, which gives a three-point suspension to the rear of the chassis, is conspicuous. The cross member of this spring is clipped to the center of the frame cross piece, and connects by double shackle with the side springs. In the shackle a cross acts as connecting link between the shackles of the cross and side springs. All three springs constituting the platform are extra long and the three longer leaves in each are held in alignment by clips. Each bolt used in the shackles is fitted with a castellated nut on one end with a cotter pin serving to lock the nut.

Winton's model K, the sole representative of this concern for this season, has the twin spring so prominent during the past





year, but not without its quota of changes. A double shackle is needed for each end of this spring, the larger shackle supporting the lower half of the spring and a shorter shackle the upper half. Heretofore the latter shackle has been shorter than the former and also within it, but it is now secured to the bolt passing through the spring hanger instead of to the top bolt of the large shackle, a construction which places the strain of the top half of the spring entirely on the bolt through the hanger and takes it entirely off the side pieces of the longer shackle. In the center of the spring a short top leaf is added which acts in the capacity of a shock absorber, working as it does against the action of the other leaves of the spring.

What can be said of the other various spring suspensions exhibited? Packard dispenses with a transverse front spring, substituting for it two half-elliptics hung beneath the frame side pieces. In the rear is introduced Mercedes types of curved hangers; in the Locomobile the rear semi-elliptics are now swung outside of the frame pieces; in the big chain-driven Columbia elliptics are still retained in the rear and semi-elliptics used in front; in the new air-cooled Marion 36-inch elliptics are used in front and half-elliptics of the same length in the rear; the Olds concern fits a full set of half-elliptics on its new four-cylinder model; elliptics are used throughout on the new 20-24-horsepower Premier; the Lozier uses a platform suspension in the rear; Ramblers have the elliptics in the rear, pivoted on top; the Marmon uses four elliptics, those in front being inside of the frame side pieces; in the new Dorris a rear platform is used, with the cross spring in front of the side ones; in the Pierce Great Arrow 40-inch semi-elliptics serve in front and for the rear others 53 inches are used; Ford, in his six-cylinder car, adopts full elliptics in rear and semi-elliptics in front. And so the story goes throughout the entire gamut of American machines. Three things are certain—semi-elliptics rule in heavy cars, elliptics in light machines and platforms have been very sparingly adopted by the makers of American cars.

Fans of Many Designs

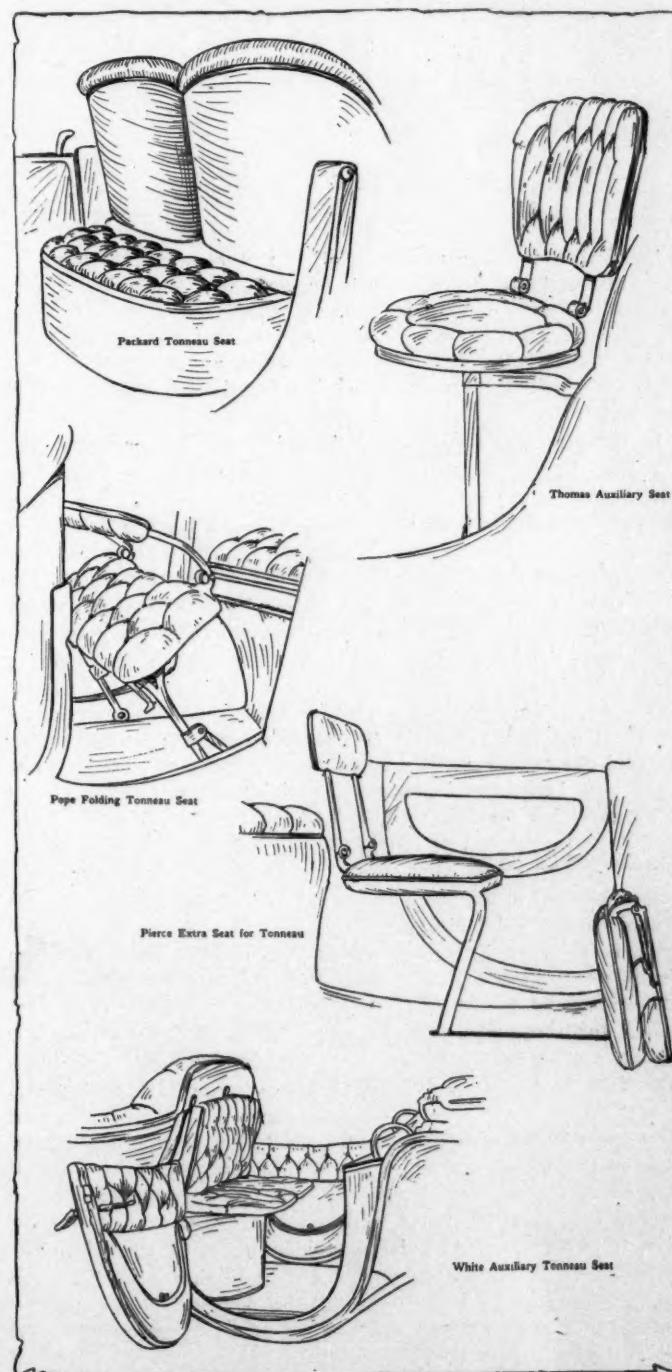
Winton drives the cooling fan in rear of the radiator through a spiral spring, the spring surrounding the fan shaft, which is gear driven. The front end of the spring attaches to the fan hub, which is loose on the shaft. The rear end of it bears upon a collar fixed to the fan shaft. The fan, as a consequence, is driven through the spring tension upon the collar, the tension being such that as the collar revolves it carries the spring and the fan around with it. With the motor starting quickly, sufficient slipping takes place between the spring and the collar to prevent the fan starting with a jerk and loosening or breaking the blades.

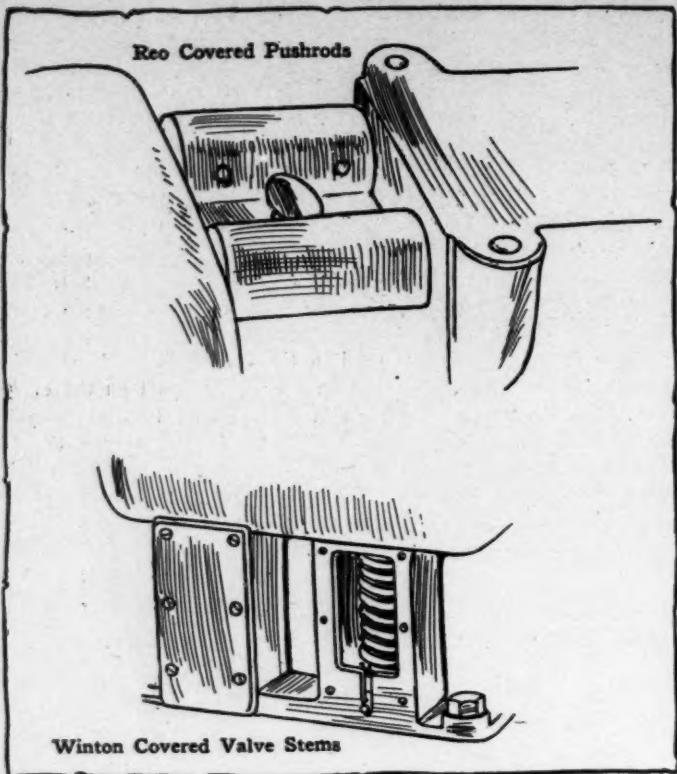
Considerable care has been taken by the Peerless concern in the fan used on its new model. Following present practice it is mounted on a triangular bracket on the front of the crank case and drives from the crankshaft through a belt. The fan shaft is mounted on ball bearings and the bearings are contained in an

eccentric cage, so in case the drive belt requires adjustment all that is necessary is to loosen a lock nut on the bearing cage and by pronged or other wrench turn the bearing cage through a part revolution, placing the thick part of the eccentric up or down, as the case may be, until the required adjustment is obtained, when the lock nut is tightened.

In Packard model 24, the company's new car, the fan is carried on the radiator, two arms extending from the upper frame work of the radiator, meeting at the fan axle where they support the bearings for the shaft. Only four propeller blades are used in the fan and the drive is through a triangular belt. The fan runs on ball bearings and makes four revolutions to every one of the crankshaft.

Extra long bearings are used in the fan shaft on Locomobile models and these are supported on a heavy support on the crank case. The drive is through a flat leather belt from the crank-shaft. Ball bears are resorted to, and in the center of the bearing part of the shaft is an individual oiler for both ball races. The fan is of the many-bladed type, each inclined at 45 degrees and secured at the outer end to a circular metal band.





In looking over the numerous other motors a perfect maze of fan construction and mounting is encountered. The new Premier uses a one-piece aluminum fan, in which the four aluminum blades resemble the propellers of a boat and are driven by a round leather belt. The fan is carried on an A-shaped support that is made integral with the casing for the half-time gears of the motor.

In the Marmon, with its four air-cooled cylinders mounted like the letter V, the eight-blade fan is carried high above them. The fan, owing to the mounting of the cylinders, is of large diameter, so the draught does not all pass through the space between them. The fan hub is made with split stub spokes, into which the fan blades are riveted. A broad circular band supports the outer ends of the blades. In the Marion the fan shaft is carried on a triangular bracket on the crank case and the drive is through a flat belt; the Pope-Toledo has its fan mounted on the cylinder head of the front cylinder; in the Ardsley it is carried, Packard-like, on the radiator; the new Olds model S has it mounted on the front cylinder head and driven by a flat belt; in the Apperson cars flat belts are used and propeller blades, and in the many other cars belt-drive is almost invariably used. The majority make provision for belt adjustment only by shortening the belt.

Non-Forged Crankshafts

Somewhat of a departure in the method of making crankshafts is used by the Columbia people this year in that the drop forged shaft is replaced by one made from a slab of special chrome nickel steel without the heating and hammering process necessary in making forgings. The metal slab is of the thickness required for the shaft and the general contour of the shaft is drilled out as indicated by the lower illustration. After this the shaft is rigged on a lathe and each bearing turned to size and then ground. This style of crankshaft has recently been largely used on European cars and has claimed for it the advantage of the metal not being injured by overheating or pounding, as sometimes takes place in the forging process. If in forging the metal is heated to a yellow heat, or even a welding heat, it is often burnt, which is evident from the cast iron-like grain so often noticeable where a forged shaft breaks. The Lozier people also cut their crankshafts from solid steel. Those makers who have adopted this method of producing crankshafts evidently believe it improved construction, and from the small

beginning on the part of one or two makers it is not unlikely to be generally adopted within the next year or so. The study of construction of the motor car is greater than ever and this close study is bringing about better metals and better schemes.

Uses One-Piece Camshaft

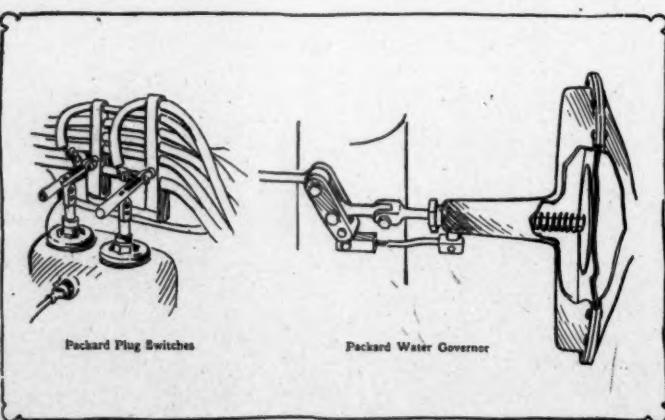
The Locomobile company has instituted a high water mark in camshaft construction in making its inlet camshaft with its eight cams in one piece and from a single piece of stock. This shaft plays the dual part of opening the inlet valves and actuating the make-and-break mechanism for the low tension ignition. The former set of cams for opening the valves are of the common style, but those for working the igniters are made in the form of a spiral, so that by sliding the shaft endwise the spiral surface of the cam will at one time cause the spark to be made earlier or later than at another, according as the shaft is moved to the front or rear. In this way the timing of the ignition is accomplished. In manufacturing the shafts a special patented machine is required in which is used a master camshaft in a similar capacity to the master cam in a profiling machine. Each camshaft comes from the machine an exact duplicate of the master camshaft, being finished and ground complete. A movement of not more than $\frac{3}{4}$ -inch lengthwise of the shaft is needed in advancing or retarding the spark, which movement is regulated from the steering column.

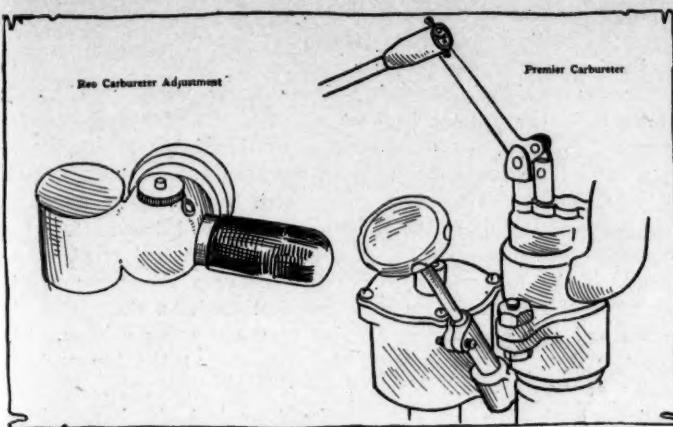
Auxiliary Tonneau Seats

A variety of designs is shown by way of additional tonneau seats. These, of course, are only found in the biggest American cars, those with a carrying capacity of seven passengers, two in front and five in the tonneau. In these machines the tonneau seat accommodates three. Generally arrangements are made for a couple or three more. The Packard firm fits a half oval seat to the back of the front seat, thereby providing room for two passengers. No provision is made on the rear of the front seat backs for a back rest. This seat is doubly useful, the heavily upholstered lid being hinged and the seat serving as a tool case, small baggage compartment or lunch box.

A drop seat the entire width of the tonneau and providing ample room for three passengers is used in the large Pope-Toledo cars. The seat is carried on a pair of end supports, each pivoted to the side pieces of the body near the floor. The top ends of the supports are made rigid with the seat. Half-way up the supports are pivoted arms with hooks on their lower ends. When the seat is placed upright in position these hooks engage with catches on the floor and hold the seat in position. The back of the seat is hinged and when closed lies across the seat. The seat itself, when not in use, drops into the forward part of the tonneau behind the front seats, entirely out of the way. The bottom of the seat acts as a footrest for the passengers in the back seat.

Thomas auxiliary seats are of the piano stool type. There are two of them in each tonneau, one just inside of the tonneau door on each side and slightly to the rear, so that entrance to the main seat is not impeded. Each seat is carried on a vertical shaft from the tonneau floor and the seat part, circular in





shape and with a hinged, upholstered back, is free to revolve, permitting the passengers to face ahead, sidewise, or to the rear, facing those in the main seat. Unlike most of the others, this seat is always in position, save for the raising of the back, and it has the advantage of allowing the passengers facing in any direction and also having the support of a curved back. The shaft carrying the seat is supported near its top by a brace from the side of the body. Passengers in leaving the main seat pass between the two revolving seats.

Additional tonneau seating in the Pierce Great Arrow follows the line of what might be termed disappearing or folding seats, those which, when not in use, fold up in rear of the front seat, the back folding upon the seat part and resting against the rear of the front seats. Two of these seats are used in each car, one at either side. Each necessitates the passengers occupying them facing to the front if they make use of the seat backs or sidewise, when the tonneau door would answer as an impromptu back support. These seats are carried on a slightly inclined iron leg which attaches to the front of the seat. This leg pivots beneath the car floor and when the seat is folded and pushed ahead to take its place behind the front seats, the leg moves through a slit in the tonneau floor. With the seat in position, a good portion, almost one-half, of the door entrance space is obstructed, making it best to have the seat folded when entering or leaving the machine. The seat has the advantage that when folded it does not occupy the least space.

The folding seat hinged to the back of the front seats is not much in evidence, except in a few smaller cars. It has the unpleasant disadvantage that the occupants must of necessity face the rear; the seat is generally narrow and the slope of the backs of the front seats is directly opposed to that required for a comfortable position. Folding seats on the doors and sides of the tonneau are almost obsolete.

The White steamer, with its wide side entrances, lends itself especially well to the type of auxiliary seat placed back to back with the front seat of the car, because the steam generator of circular shape occupies this part of the car and gives a slightly rounded effect to the front of the tonneau. The two folding seats are placed over this rounded piece. The backs of them are hinged to the back of the front seat at the top. The seat parts are so hinged that they, too, when folded, are carried between this back and that of the front seats. Either one or both seats can be used at a time or one used and the other left folded. The seating part is wide and the back, being a separate part, is inclined to furnish a rest for the occupants. The seats, when down, do not interfere with entering the tonneau.

Packard's Water Governor

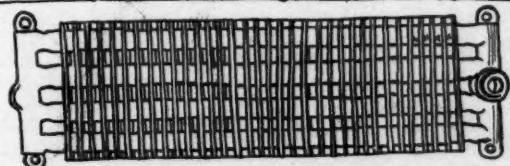
The Packard water governor, controlling the carburetor throttle, together with magneto high tension ignition, are two of the features of the new motor. The water governor, as shown in the illustration, consists of a diaphragm of leather and metal clamped between the halves of a large casing, into one end of which enters a water pipe from the cooling system and from the same end is an exit passage. The water bears only on one side

of the diaphragm. Bearing against the opposite side of it is a metal disk fastened to the end of a shaft which passes out through a sleeve-like part of the casing and couples to a lever which is carried on the throttle axis. The upper end of the lever connects with the throttle control on the steering column. With every increase in motor speed the water pump speed is increased and its added speed creates greater pressure in the entire water system. Consequently the water presses upon the governor diaphragm with greater force, forcing the diaphragm to the left against the tension of the coil spring and so partly closes the throttle. After the speed slackens and the pressure within the water system is reduced, the coil spring moves the diaphragm back to its normal position. This style of governor has been in use several seasons on the Napier cars made in England, and on one or more other cars.

In connection with the Packard ignition scheme is the use of double blade knife switches connecting between the spark plugs in the cylinder heads and the high tension wires carrying the current to the plugs. The wires are supported by a vertical fiber framework on the cylinder head. Hinged to the bottom of this framework is a split switch with handle. The switch fits over a pencil-like cap screwed onto the top of the plug. By this connection any cylinder can be instantly cut out. With these switches ordinary spark plugs may be used, the pencil-parts for receiving the switch blades being adapted to fasten to any standard line of plugs.

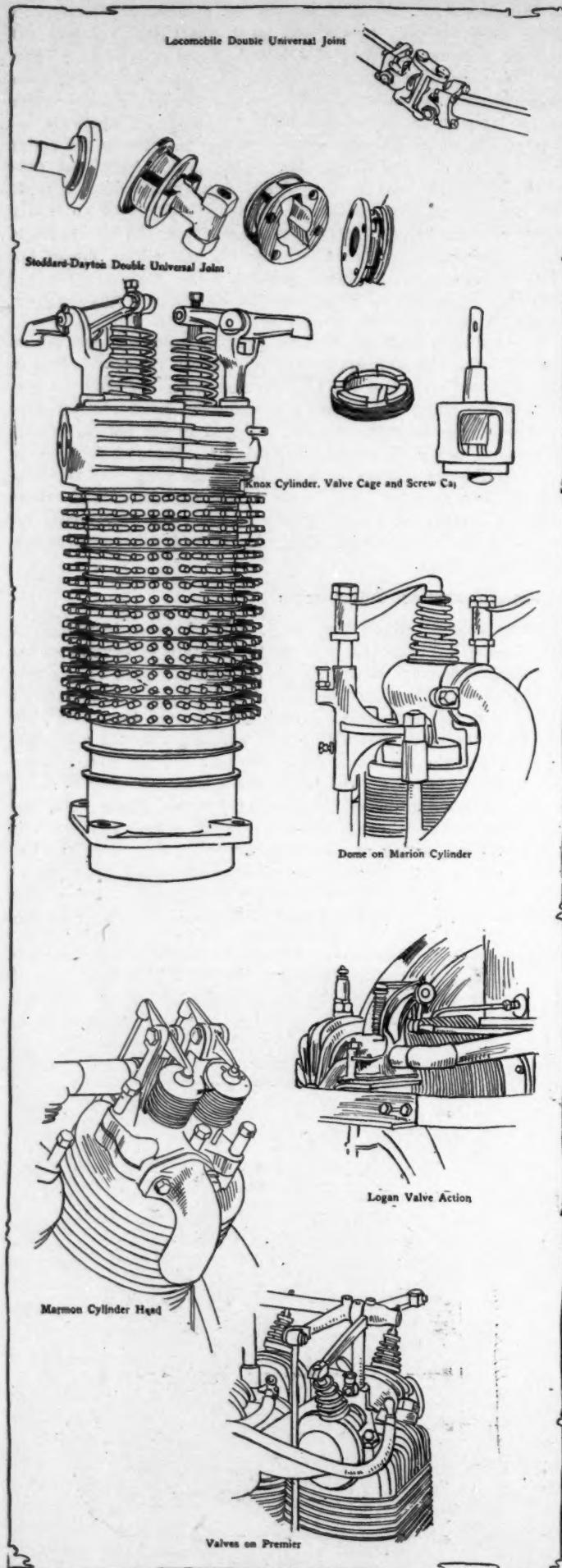
External Carbureter Adjustments

Being able to adjust the needle valve in a carburetor from the outside is unmistakably a worthy feature of several of the new carburetors exhibited. As simple adjustment as any is that on the new Reo, the latest design of R. E. Olds. The illustration shows that this carburetor, as was the previous type, is carried direct on the valve port with a knit covering over the air intake at the right, the float chamber to the left and the mixing chamber between them. On the top of the mixing chamber is shown a small adjustment wheel with serrated edges, like a coin. On the right of the wheel is a small, pointed spring that rests in the serrations, acting as a locknut, retaining the wheel in whatever position it is placed. The wheel is accessible by removing a board in the footboard of the car and a part turn of the serrated wheel to the right or left will serve to increase or diminish the flow



Radiator on Reo





of fuel, without having to dismount the apparatus or in any way interfere with its other adjustments.

In the Premier carburetor a control of the fuel to the nozzle from the outside is through a large finger wheel, which works a valve in the passage between the float chamber and spraying nozzle. A part turn of the wheel to the right or left adjusts the flow. The company, in its carburetor, uses a mixing chamber of vertical cylindrical shape, with the spraying nozzle in the bottom center and the throttle as a vertical drum, raised and lowered within the mixing chamber through a bell crank movement on the top of the carburetor. A very short arm of the bell crank is pivoted to a short vertical shaft on the top of the drum and the long arm is coupled to the steering column. The throttle drum has two series of ports, one at the top and the other at the bottom, with transfer ports connecting the two series. With slow motor speed the drum is in its low position, the lower series is closed and the mixture passes to the cylinders through the top series. With faster speeds the throttle is raised, uncovering the lower series. Air is permitted to pass direct to the mixture without traversing the spraying nozzle, thus giving a weaker mixture.

Double Universal Joints

In the Locomobile and Stoddard-Dayton models a double style of universal joint is used between the clutch and gear box, the object of it being that the clutch can be removed without dismounting the gear box or varying the alignment of any of the parts, none of the bearings even being molested. The Locomobile joint consists of five parts, two of which are duplicate pairs, the fifth, a center part, joining the two duplicate sets together. Both the clutch shaft and that to the gear box terminate in square flanges, to which are bolted flange cross pieces carrying a bearing for a cross bolt, the bolt receiving at either ends the jawtype of arms in one of the crosses in the joint. The two crosses are then in turn connected by a center block, one cross being pivoted to one end of the block and the second one to the other. Both crosses attach to their shafts with their jaws in the same plane, so that by taking out the bolts carrying the jaw arms of the crosses, both crosses and the center piece uniting them can be dropped out of position.

The Dayton joint has a double T-shaped piece in the center with the arms of the T at opposite ends placed at right angles to each other. Each T part enters a slot in a ring piece that bolts to a flange on the end of the clutch shaft in one case, and to a flange on the gear shaft end in the other case. In dismantling the joint the bolts coupling the ring pieces to the flanges on the respective shafts must be removed when the ring parts and the double connecting T-piece will drop out of position.

In most of the other machines the universal joint is not used between the clutch and gear box. Not a few machines unite the clutch and gear shaft by facing flanges on the shaft ends, the flanges being bolted together. In other machines, a positive jaw type of joint is used, which permits of removing the clutch only after the gear box has been dismantled.

Air-Coolers' Cylinder Heads

Massiveness characterizes the cylinder heads of the new Marion air-cooler, in which the four cylinders are mounted lengthwise beneath the bonnet. Instead of using radiating fins on the heads the exhaust valves are placed centrally in the head and each valve enclosed in a large, hollow, metal dome, from the right side of which the exhaust pipe leaves. These domes permit of rapid expansion of the hot exhaust gases; expansion of these gases means a big drop in their temperature, which further interpreted means that the valves are kept cooler. The exhaust valves are operated through a vertical pull rod at the side of the cylinder, working in a long guide fastened to the cylinder head. On the top of the rod is a horizontal arm, held in position by nut and locknut, and with its outer end resting on the top of the valve stem. These rods pass through square guides

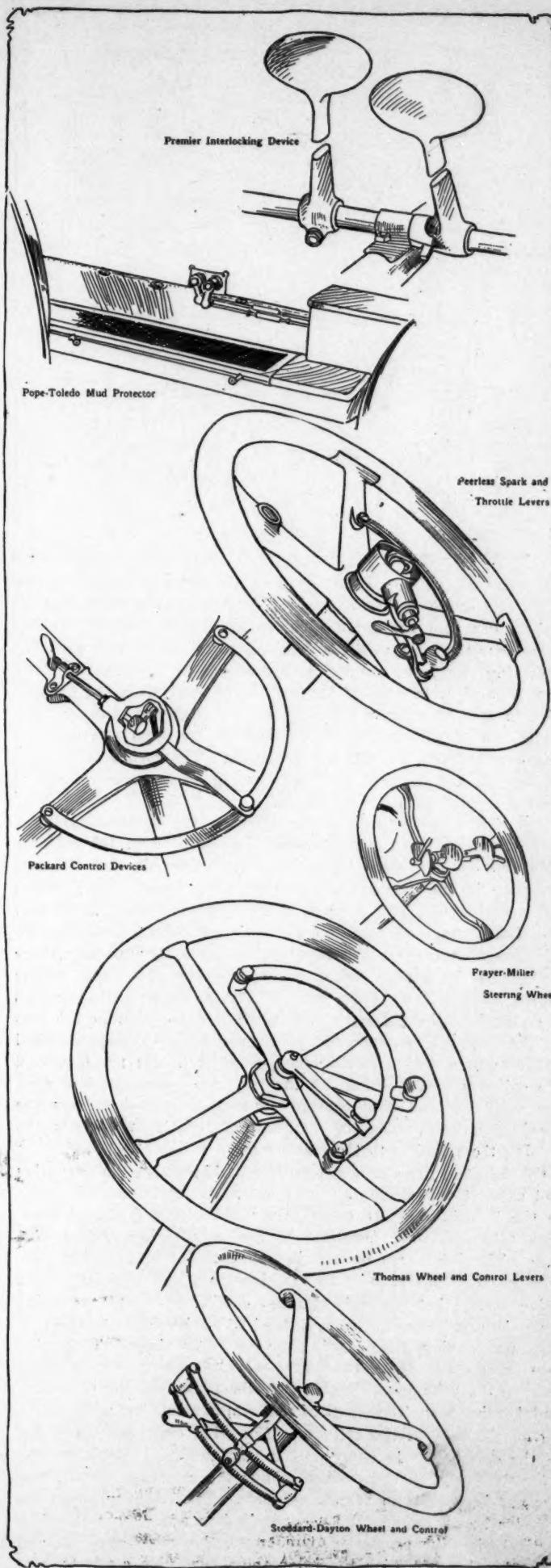
in the top of the crankcase and their lower ends are fitted with a sort of yoke passing around the camshaft and carrying a cam roller underneath the cams. The inlets are in conventional ports at the forward left of the cylinders and are operated from vertical push rods. In removing them a screw cap in the top of the port is taken out. In removing any of the exhaust valves the entire cylinder head has to be removed and the union with the exhaust and intake pipe separated.

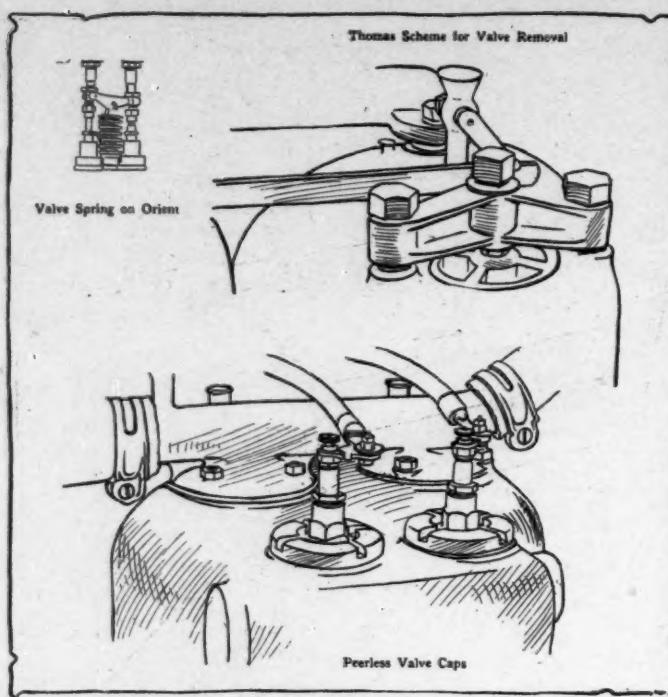
In the Marmon air-cooled motor the cylinders are made with the heads integral. The inlet and exhaust valves are located side by side on the cylinder head, each valve in a cage secured by screws with hexagonal nuts. Both valves are opened by overhead rocker arms, one end of each arm resting on the valve stem and the other, slightly cup-shaped to receive the top end of the push rod, placed on the inside of the cylinder. A yoked support on the valve cage carries the rocker arm, so that in removing the valve cage the rocker arm is also removed. Before the cages can be removed, however, it is necessary to uncouple either the intake or exhaust pipe, according to the valve taken out. The valve springs are of large diameter and rest between a bottom support on the valve cage and a top washer cotter pinned to the stem. The head is cooled by circular flanges of the same diameter as used on the cylinder walls.

Cylinder cooling in the new Logan runabout's horizontal cylinders is by equally-spaced copper flanges surrounding the cylinder walls. In the cylinder heads are radiating metal flanges made integral with the head. In order to have the valves placed vertically at the side of the cylinder heads, the inlets directly above the exhausts, separate valve cages are bolted to port-like projections on the cylinder head. In opening the valves recourse is had to a bell crank pivoted between curved arms on the valve cage, one end of the crank resting on the valve stem and the other pivoted to the end of a horizontal pull rod worked from a camshaft within the top of the crank case. In this motor cooling is aided by a six-blade rotary fan on the end of the crankshaft, and also by a hopper device in the top of the crank case, which leaves the top of the case open, allowing the hot gases to escape but retaining the lubricant by means of a coarse wire screen.

Some little differences are met in the cylinder head construction of the new Premier model, compared with other standard air-coolers. The valves are located in separate cages at opposite sides of the head and have the valve stems set at 22½ degrees to the vertical and provided with conical spiral springs secured on top by a washer. In opening the valves overhead rocker arms are used, these made very long so that the valve at the right side is opened by a push rod at the left and vice versa. Rather than use a separate rod for pivoting each rocker arm on, one long rod extends from front to rear of the motor over the cylinder heads. On it all of the rocker arms are supported, there being a support for the rod on each cylinder and spacing sleeves surrounding it for retaining the rocker arms in position. The arms are pivoted to the push rods. The ends resting on the valve stems are yoked and carry a short screw piece which bears upon the valve stems. This piece is adjustable, a screw in the rocker arm yoke acting as a lock nut. Each cylinder head is cooled by vertical flanges, as are the valve cages. Induction and exhaust pipes are held in place by a pair of cross bolts passing through each set of pipes and cross between the cylinders. By tightening nuts on one end of the bolts both sets of pipes are drawn into the valve cages. In removing any valve it is consequently necessary to loosen these pipe connections as well as take off the nuts securing the valve cages.

Throughout the Franklin line of motors, the mechanical valves are regularly located side by side in the cylinder heads, each valve carried in a cage fitting in a circular opening in the cylinder head and retained therein by a pair of bolts. By using cooling fins on the cages, as well as on the auxiliary exhaust cages at the bottom of the cylinders, extra cooling surface is provided. Both inlet and exhaust valve cages resemble a snail shell without the many passages found in the latter. To the





open end of the cage is fitted either the inlet or exhaust pipes. Both sets of pipes lie close to the cylinder heads, each cylinder exhausting into the same pipe, from which a single opening from near the center affords connection for the muffler pipe. In removing any valve the valve cage has to be disconnected from the inlet pipe, in case of an inlet valve, and from the exhaust pipe in case of exhaust valve, as well as from the cylinder head. Both sets of valves are opened from rocker arms worked from one camshaft on the left of the motor. The rocker arms have adjustable cup pieces in the ends bearing on the valve stems, so that the valve lifts can be varied.

Practically the only air-cooled following the water-cooled practice of placing both sets of valves in one port on the cylinder side and opening them by vertical push rods, is the Waltham company in its Orient four-cylinder cars. This concern places the ports on the left, cools them by eight circular flanges that are continuous with those on the cylinder walls and makes use of removable caps in the tops of the ports through which the valves can be quickly taken out without loosening any of the piping connections. Both sets of valves, inlets and exhausts, are placed in the bottom of the ports, and the caps in the tops of the inlet ports carry the spark plugs. Five large vertical flanges and a set of smaller flanges on each side of them cool the cylinder heads, which, by the way, are made separate from the cylinders and held thereto by long bolts rising from the crank case, performing the dual role of securing the heads and holding the cylinders to the crank case.

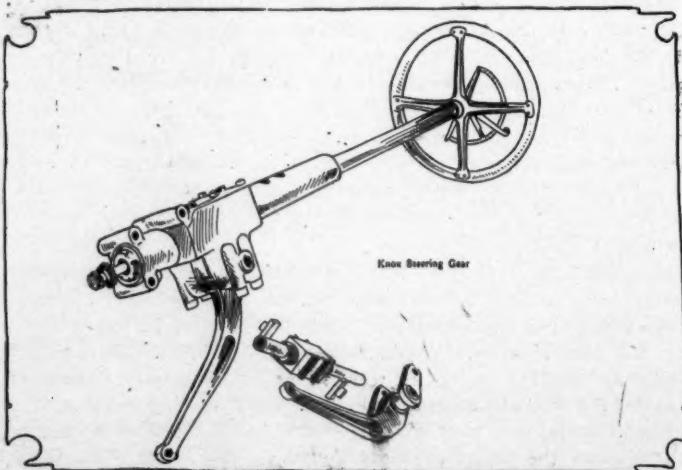
Of the other air-cooled motors, the Corbin places the admission and exhaust valves side by side, one to the right and the other to the left, in separate cages in the cylinder heads, and opens both sets from one camshaft in the right side of the crank case. The inlets are opened in conventional manner by overhead rocker arms pivoted to the push rods and bearing on the valve stems, but the exhausts are opened by pull rods rising from the crank case between, instead of at the sides of the cylinders, and having arms bearing on the valve stems. These pull rods within the crank case have a yoke ending with a roller between the yoke arms. The center of this arm is pivoted to a depending lug on the base of the cylinder. The other end bears on a cam on the camshaft. In short rocker arms are used for inlets and exhausts, but with them placed above the cylinders for the former and beneath them for the exhausts. This company makes the cylinder heads integral with the cylinders and uses on each a vertical pipe-like projection, into which the valve cage fits and from the side of which the inlet or exhaust pipe connects, ren-

derring it necessary to remove a cap retaining the cage when taking out a valve, and thus leaving all of the pipings intact and not loosened.

Accessibility has been aimed at and achieved in valve removal in the new four-cylinder Knox, in which the cylinders are mounted vertically in front. Both sets of valves, mechanically opened, are located side by side, the inlets to the front. Each is within a raised valve cage in the cylinder head, the cages suitably cooled by circular flanges and having respective connection with the carburetor and muffler through side openings, so the connections are not molested in removing the valves. A pair of camshafts, with overhead rocker arms, do the opening. The rocker arms are not pivoted at either end, but held to the top of the push rods by coiled springs, thereby eliminating the striking noise. The arms are yoked on the valve stem ends and carry an adjusting piece locked in position by a side screw. A screw cap retains each valve cage in its place, so that in removing a valve the bolt supporting the rocker arm and the cage cap are the only parts to be taken off before the valve cage can be lifted out. This requires but a few seconds.

Accessibility of Valves

"Are the valves accessible?" is a question heard in every booth in both exhibitions, and it is a safe assertion that most of the askers of this question have at one time or another had experiences either with broken valves, poor compression, or valves in need of grinding. Accessibility has been gained in most of the big machines as well as in the smaller models, whether the latter are furnished with vertical motors in front or horizontal styles beneath the bonnet or car body. Where the valves are placed in the cylinder heads and opened through overhead rocker arms, some rapid strides in accessibility appear. For instance, in the new Pope-Toledo motor, where such is the case, either the intakes or exhausts can be removed by slackening one nut and knocking out the bolt on which the yoke holding the valves in position is pivoted on, the whole work not requiring more than 35 seconds. The inlet and exhaust valve in each cylinder are side by side, one at the right and the other at the left, and both contained in very deep recesses in the cylinder head. The carburetor and muffler pipes enter through the sides of the head, the sides of the valve cages having openings registering with those for admitting and liberating the gases. Both cages are retained in position by an arched yoke with a pair of feet spanning the exhaust valve stem and resting on the sides of the cage at one end, and a single arm on the other end resting on the inlet cage. The yoke in the center is held to the cylinder head by a cross bolt through an eyehole in it, and held to the cylinder by a pair of studs with eyeholes. In the single arm of the yoke bearing on the inlet cage is a set screw which bears upon the cage. In removing the yoke first this set screw is loosened and then the cross bolt retaining the yoke removed. By tightening the set screw the yoke is forced down upon the inlet and exhaust cages because of its being pivoted at the center. As the pushrods are not



pivoted to the ends of the rocker arms, the latter do not interfere in the valve removal, they being pivoted to integral arms on the exhaust cage and coming off with it. Both sets of cages have a ground fit with the cylinder head openings.

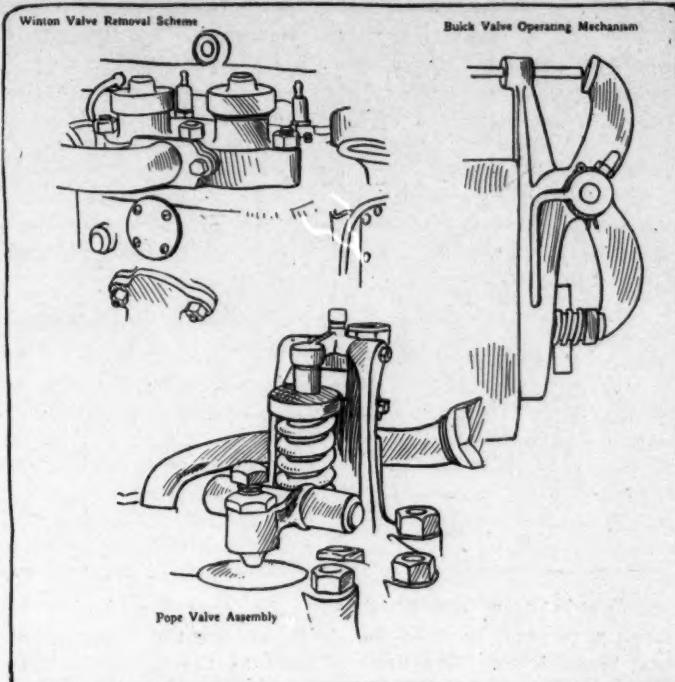
The Locomobile company has this season dispensed with the yoke method of holding the valve cages in position, one yoke sufficing for the inlets or exhausts in each pair of cylinders. Each valve is now removed through a round opening in the top of the port, the opening being closed by a screw cap.

In the new Thomas motor, with its separately cast cylinders and mechanical valves in the bottom of ports on opposite sides, the cap covering the opening in the valve ports above each valve is retained by a yoke. One end of the yoke has a vertical eyehole through which a vertical stud pivots the end to the cylinder, and on the other end is a hook that grips a similar stud at the opposite side of the opening. In the center of the yoke a vertical set screw bears directly on the center of the valve cage, and through it the cage is tightened in position. In removing a valve this screw is slightly loosened, then the yoke swung on its end pivot and the cap lifted out.

Screw caps enclose the openings in the tops of the valve ports, through which the valves are removed, in the new Peerless motor. These caps differ from others in that they have a pair of square-cornered slots cutting the top of the cap at right angles and intersecting in the center. In case a driver is without a wrench an ordinary punch or other straight tool will suffice to loosen the cap. The spark plugs are held in the centers of the inlet caps. In the same illustration of the head of a pair of cylinders it is shown that the water pipes leaving each cylinder head have large plates made integral. These plates cover a good portion of the jacket head and give a very rigid joint. The top water pipe over each cylinder is joined with the other pair of cylinders by a short length of rubber hose and a similar union connects the front cylinder pair with the pipe to the radiator.

Because of using air control of the inlet valves the Winton valve removal calls for an uncoupling of the air pipes connecting with the valve cages, the uncoupling of the inlet pipe from the carburetor and the removal of the cage. As the exhaust valve stems screw into feet that bear on the camshaft, thus eliminating pushrods, the valve stems have to be unscrewed from these before removal. The inlet valves have to be removed before the exhausts can be taken out, owing to the former being in the top of the port and the latter in the bottom. In this motor a neat construction is noticed in enclosing the pushrods in separate compartments connecting between the bottom of the valve ports and the top of the crankcase. A plate held by six screws covers the outer surface of the cage. In the bottom of the outer part of the cage is a vertical slot which serves as a guide for preventing the valve stem turning, a pin in the stem working within the slot.

One other concern covering the valve stems and pushrods is the Reo, in which each horizontal cylinder carries an expansion on its top side for housing the pushrods and the valve

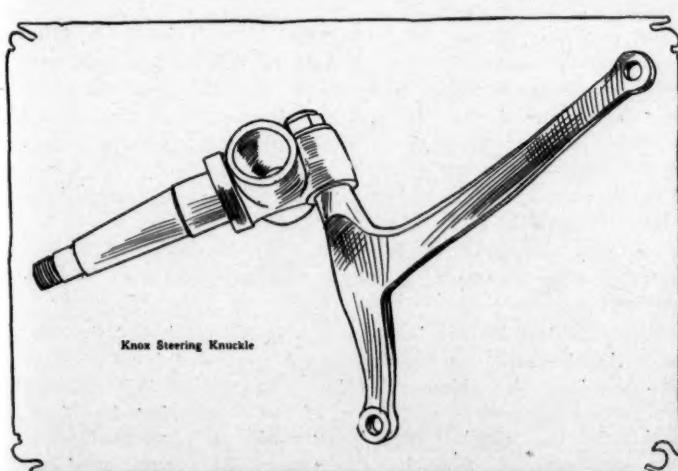


stems are protected by a cage resembling a pair of semi-circles placed side by side, one over each valve stem. A thumbscrew between the semi-circular parts enters the cylinder and holds the cover in place.

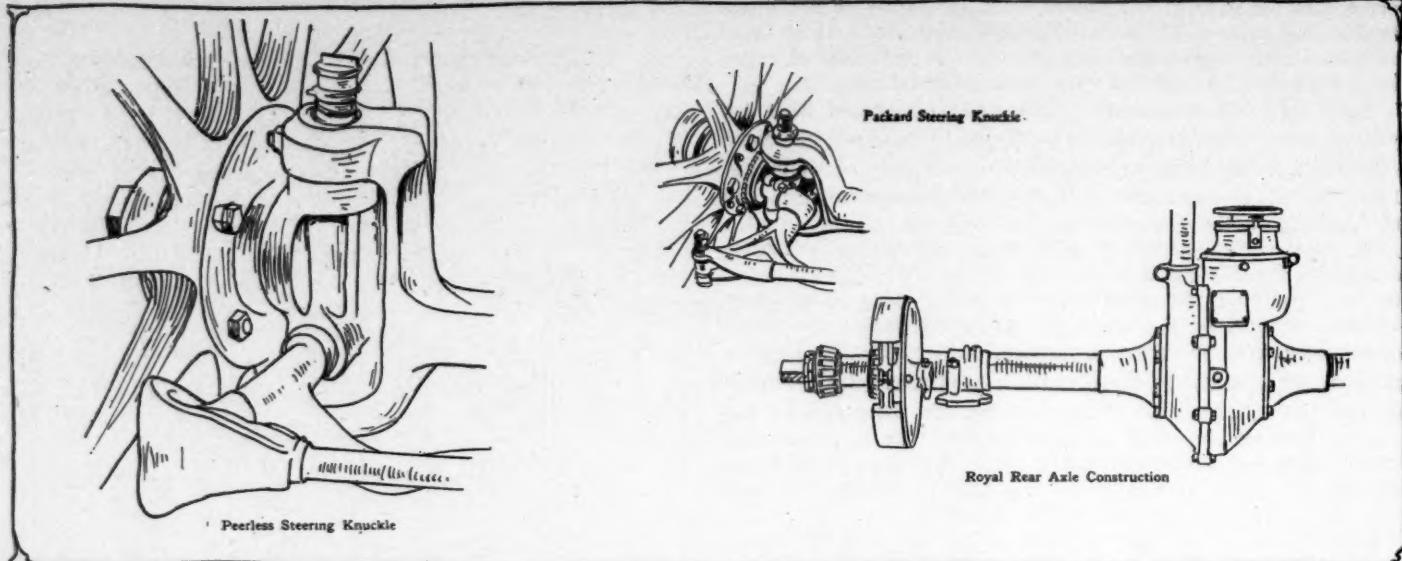
In the many other vertical motor screw caps covering the openings in the valve ports and through which the valves are removed, are found. The Packard uses this method; the same holds good with the Apperson machines, in which the cylinders are separate castings with valves in opposite ports; in the York cars similar construction is followed; the Darracq follows suit; the Lozier car, with cylinders in pairs and valves at opposite sides, makes use of a yoke for retaining the inlet valve caps for each pair and another yoke for the exhausts; the Dorris, a new St. Louis production, with valves in the cylinder heads, uses screw caps for retaining the valve cages; in the Crawford motor screw caps cover the top openings; the same is true of the Stoddard-Dayton, Pierce, Welch, Chadwick, Columbia, Olds model S, Royal, and Rambler, whereas in the Rainier and Cleveland yokes are resorted to.

Of valve removal in horizontal cylinders much diversity exists. In the Buick the valve cages enter openings in the cylinder heads, valve ports not being used, and in order to have the valve stems horizontal a rocker arm action is made use of. Each rocker arm is pivoted to the valve cage in its center, with the pushrod guided through an eyehole in the top of the cage and bearing against its upper end, and the lower end resting on the valve. This disposition places the pushrods above the cylinders and leaves the valves most accessible, each cage being retained by a yoke. Those makers of horizontal cylinders who make use of ports on the top or under side of the cylinder heads for the valves almost invariably use cap openings in the heads of the ports through which the valves can be taken out.

A majority of the cars now interlock the clutch with either the regular or emergency brakes or with both, so that applying the brakes draws out the clutch. In the new Premier model the interlocker with the regular brake is easily taken off, removing one pin being all that is necessary. The right pedal in the illustration applies the brake when thrust forward, the pedal, by the way, being loose on the cross shaft. To the left is the clutch pedal clamped to the shaft. Between the pedals is pinned to the shaft a short collar with a horizontal horn extending partly across the hub of the brake pedal. On the brake pedal hub is a similar horn slanting to the rear and crossing the other horn at right angles, so that when the brake pedal is thrust forward its horn locks with that on the interlocker and carries the clutch shaft through a part rotation, releasing the clutch. The inter-



Knox Steering Knuckle



connection between the clutch and the emergency brakes is through a two-arm lever on the shaft carrying the brake emergency brake lever. One arm connects to the rear with the brakes and the other to the front with the clutch shaft.

Steering Knuckles

Indefatigable in the construction of almost every part of its new machine, it is little wonder that the Knox concern has a host of little points in connection with its model G that merits inspection. A nut and screw steering gear is made use of in this model, and in the steering column illustration it can be noted in the dissembled parts what steep pitch is used in the screw, how heavily the nut surrounding it is made and how it has on two sides guides for carrying the trunnions to which the steering arm, shown to the right of the group, is carried. This arm is a one-piece forging made with a claimed tensile strength of 120,000 foot-pounds and takes its main bearing in a projection of the steering gear case. In the steering column are two tubular shafts, each of which carries a small bevel pinion at the lower end and a small lever on top working in a serrated semi-circle. A plate on the left side of the steering gear case is removed when the gear parts are placed in the case and when again bolted in position holds the nut firmly from turning. The steering knuckle is a one-piece forging made from nickel steel of high tensile strength and has the hub part of large diameter. The three-arm steering lever is also a one-piece forging made from the same metal and has an adjustable fit with the knuckle part, the adjustment of this part being made through a nut and cotter pin.

To once more refer to the new Peerless, it will suffice to say that in it, too, like many of the other parts of the machine, the steering knuckle is stoutly made. The knuckle itself is a one-piece forging with a tapering stub axle for the road wheel, a broad, circular part reinforcing the attachment of this spindle to the vertical hub and the hub expanded at the top to give greater bearing surface. In the bottom of the hub is an eyehole for attachment of the forged three-arm steering lever, which is held to the knuckle part by castellated nut and cotter pin. The arm of this lever, connecting with the tie rod between the steering knuckles, is short, whereas that having a ball and socket joint with the rod to the bottom of the steering gear is more than twice as long. In this car the much-talked-of I-beam front axle is missing, a stout, square-section forging taking its place. Each end of the axle carries a square jaw for receiving the steering knuckle and on top of each jaw is an oil reservoir for the top balls to revolve in.

Packard 24 is another model without the I-beam front axle, its maker preferring to continue the tubular steel axle, $2\frac{1}{2}$ inches in diameter, with a wall thickness of $\frac{3}{8}$ -inch, which has satisfactorily served in the past. The axle forks are heavy steel

drop forgings with expansions for containing the Hess-Bright ball bearings used in carrying the lead. Steering levers are also drop forgings with three arms, that to the knuckle hub having attachment in the bottom of the hub, not directly into it, but rather into an expansion at the inner side, thus giving the arm the advantage of a short leverage in turning the wheel. The tie rod connecting the knuckles has forked ends and at the left, not shown in the illustration, is a length adjustment. Connections from the third arm of the steering lever with the rod from the steering column is by ball and socket joint. The knuckle pin is 1 inch in diameter.

Steering Wheels

What must be acknowledged as good control is the mounting of the spark and throttle levers on the steering wheel in the Peerless, so that both are always together, whether the spark is advanced and the throttle closed or the throttle wide open with the spark retarded. The throttle lever works in a serrated semi-circle within the steering wheel, and is attached to the top of a tube within the steering column, this tube turning with the lever. The spark lever is carried on the throttle lever and is of the thumb type. It is on the end of a short horizontal shaft that has a crank or offset in the center of the column, and to this offset is attached a central rod in the steering column, so that when the lever is to the rear, as shown, the central rod is raised and with turning the lever through a half turn to the front the rod is dropped. The rod has bell crank connections with the commutator at the base. The advantage of having both spark and throttle levers always together is apparent, one hand at all times sufficing to work both. The hand is sufficient to move the throttle lever around in its semi-circle and at the same time the thumb, sufficient for the spark lever, is always free for changing it.

The Packard concern uses spark and throttle levers working on exactly the same principle as those on the Peerless, but does not carry the spark thumb lever on the throttle one. The spark lever is carried on one of the arms of the steering wheel and at its inner end carries a short crank, to which a vertical rod in the center of the steering column is secured.

On the Thomas a pair of hand levers working on a semi-circle in the center of the steering wheel cares for the spark and throttle control. One lever works within the semi-circle, which has a serrated edge for locking the lever, and the other works on the outer surface.

In the Stoddard-Dayton both control levers, spark and throttle, are carried beneath the steering wheel, each working in a separate quadrant, one above the other. The Frayer-Miller places both spark and throttle on the top of the column but free from rotation by the wheel. Each lever works in a vertical semi-circle with a series of small holes around the periphery of the

semi-circle in which the levers can be locked. One lever is to the right and the other at the left, and both connect through short axles with connections in the center of the steering column. The Austin car is equipped with a circular guide for the spark and throttle levers, one working in the right half of the guide and the other in the left. Hand grips in the rim of the steering wheel are used in all of the new Autocars, the same as used last season. With the Rambler firm, the tilting ring beneath the wheel is retained on this year's models.

Floating Rear Axles

Floating axles, that were last year the talking point of the few, are this year the argument of the many. Readers of Motor Age are in general familiar with this type of axle construction, and a glance at the illustration of one-half of the Royal axle will reveal that the feature consists in the axle housings extending through the brake drums so as to carry the wheel hubs. In this axle the outer and inner races of roller bearings for the road wheel can be seen. Both drive shafts within the axle housing have a square fit within the differential gears, so that when the wheel hub cap is removed and the jaw clutch which fits on the square end of the drive shaft, and has teeth locking with others on the wheel hub, is taken off, the drive shaft can be drawn out, leaving the car supported entirely on the axle casing. The advantage advanced for this style of axle, and it is correct, is that the driving shafts are called to meet only the strain consequent upon revolving the road wheels, the casings caring for all the other strains.

Some Novel Brake Schemes

Internal expansion brakes acting within dust-proof drums on the rear hubs have superseded the band type, but the latter in many machines remains in use for regular brakes carried on the cardan shaft and on the jackshaft in chain-driven cars. Pope-Toledo people have set a new mark this season in making both sets of brakes of the internal expanding type and placing them both within drums on the rear hubs. The drums are made very wide and the emergency and regular brake bands placed side by side, being made of medium width for the purpose. Both sets are expanded by cam action, the emergencies operated through a side lever and the regulars by pedal.

Other makers using two regular brakes and two emergencies place the emergencies within drums on the rear hubs and the regular brakes outside of the drums. This design is used in the Peerless, in which the bronze expander is made in one piece supported at the base and held from the drum by coil springs. It is expanded by a diamond-shaped expander working between the end expansions of the bronze shoe. The external band is a fibre-lined part tightened by bell crank action. The drum is 10 inches in diameter and $2\frac{1}{2}$ inches wide. This concern introduces single trees or equalizers beneath the body frame, so that

in applying the brakes there is an even pressure on each. One or both sets are interconnected with the clutch.

This year the Locomobile has the emergency brake drum and chain sprocket bolted to every spoke in the rear wheels, instead of to alternate spokes, and it should be noticed in the rear axles of these machines that they are dropped inside of the spring seatings and have the rear semi-elliptic springs thrown outside of the frame pieces, so that the chassis frame is hung lower and has the advantage of being able to lower because of the drop in the axle. Both axles in these machines are made in I-beam form and are drop forgings.

Timing Devices

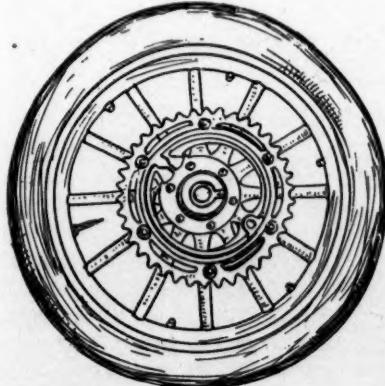
A prevalent custom, that of placing the commutator on the top of a vertical shaft at the rear of the motor and driving it by bevel gears from the camshaft, is followed by many makers, but the Thomas firm places the commutator on the dash so that its working can be seen all the time by the driver. Placing it in this position calls for drive through a many-jointed vertical shaft in front of the dash. This shaft takes its drive from one of the camshafts through a pair of bevels enclosed in a suitable housing. The shaft has two universal joints, one at the bottom and the other near its top, and between them is a telescopic part by which adjustments can be made and wear taken up. The top of the shaft transmits the drive to the horizontal axis of the commutator through bevel gears.

Of the numerous other makers it might be mentioned that Packard carries the commutator on the top of a vertical shaft at the rear left of the motor. In the Ramblers it is carried on a short, vertical shaft beneath the toe part of the footboard. The vertical shaft scheme serves in the Chadwick; in the Peerless is used a short, angularly-mounted shaft in the rear at the right side; in the Pope-Toledo and Pope-Hartford a short shaft, mounted at an angle between the pairs of cylinders, is used; the Royal makes use of a flexible shaft between the pairs of cylinders, carrying the commutator as high as the cylinder heads; in the Marion it is carried on the end of a short, horizontal shaft at the side of the crank case; the Premier uses a very short, vertical shaft at the left rear; Olds has a high vertical shaft in the rear, so do the Pierce and Stoddard-Dayton, and in the big chain-driven Columbia it is mounted at an angle at the right between the rear cylinders. In every case it is gear-driven from one of the camshafts. The Apperson firm continues to mount it on the dash and drive through a chain from the camshaft.

Valve Rods of Many Designs

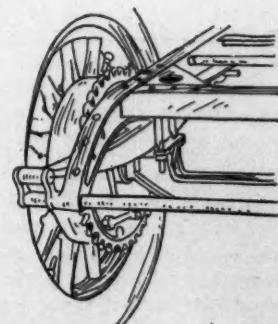
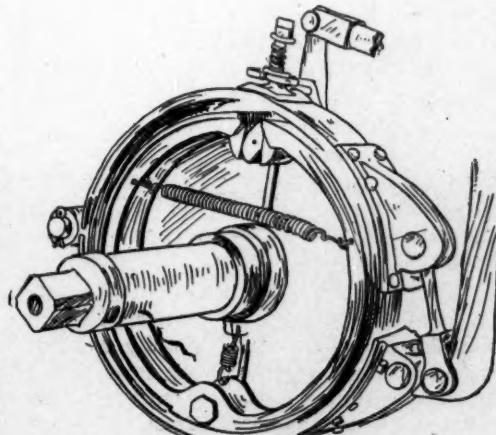
The 1906 cars have by no means settled many disputed points in the matter of construction and design—of frames, body, motor and other things—and the different ideas that exist are shown quite as well in the matter of valve operating schemes as in any other part of a car. There is of course a predominating idea,

Pope-Toledo Double Brake Scheme



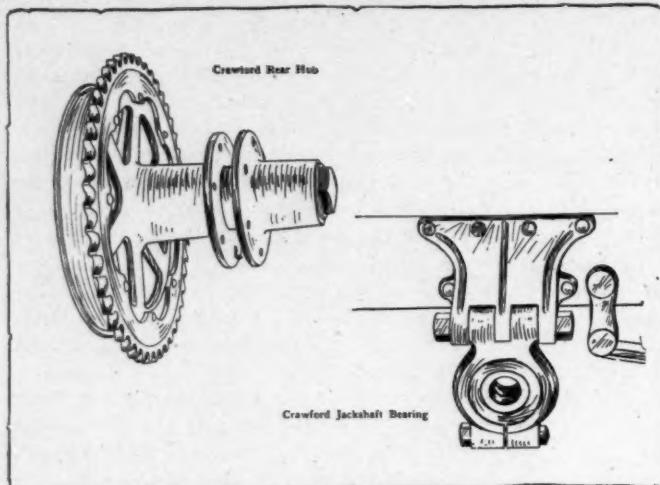
Locomobile Rear Axle

Pierce Double Brake



but there are many other ideas and the other ideas have points which stand well in argument and in practice, so that they must be taken into consideration. While some makers have abandoned the scheme of placing valves in cylinder heads and gone back to the practice of using the valves in ports on cylinder sides, others have come to a diametrically opposite design. Apparently design in valve-actuating has pretty nearly reached its zenith, for there are but two or three principles and these principles have not been improved upon or altered for a number of years. Another decade, however, will bring about changes that are not thought of at this age.

Those makers using motors with the valves in the bottom of ports on the side of the cylinders almost invariably use vertical pushrods, with a coil spring surrounding each valve stem for holding the valves closed. In the Columbia cars and also in the



four-cylinder Orient one spring is used for each pair of valve stems. The spring is mounted between the valve stems and carries on its upper end a cross yoke that works in slots in the bottom of the valve stems. When one valve is raised through the pushrod action the fulcrum of the cross lever is in the other valve stem, and vice versa. The spring hooks into the cross lever and is easily removed. In the Orient motors practically the same construction remains except that the valve stems are not slotted, but the cross lever to which the coil spring is attached has yoke ends which span the tops of the pushrods. On the tops of the rods are square heads against which the yokes bear, and beneath the yokes are nuts and locknuts, the yokes mentioned above working between them.

Radiators Not All One Pattern

Radiators are not, as prophesied by the wise ones a year ago, all of the honeycomb variety—far from it. Many are of the horizontal tube variety, others prefer the vertical tube type, and a few others use combination devices. The Peerless consists of fifteen cross tubes, each $\frac{1}{4}$ inch deep and about 1 inch wide and placed edgewise to the wind. The tubes are arranged in sets of three with turns at either ends and through which the water flows from the top to the bottom in series, traversing a total cooling area of 128 square feet. The only tank space of the radiator is in the bottom and a pipe from the filling nozzle on the top leads directly to this reservoir, so that water when put in rises from the bottom to the top, expelling all the air ahead of it. In the reservoir is a drip cock through which all the water can be drained off. The entire water capacity of the cooling system is 6 gallons. Each set of pipes in the radiator is surrounded by vertical flanges.

In the new Rambler models a simple style of radiator is used which is made by the Jeffery firm. Vertical flat tubes of approximately 4 inches in width and very narrow are placed edgewise to the wind, and connect with bottom and top water tanks. The tubes are soldered in position at the top and bottom and are held apart throughout their length by cross metal bridges, which act as fins in radiating the heat.

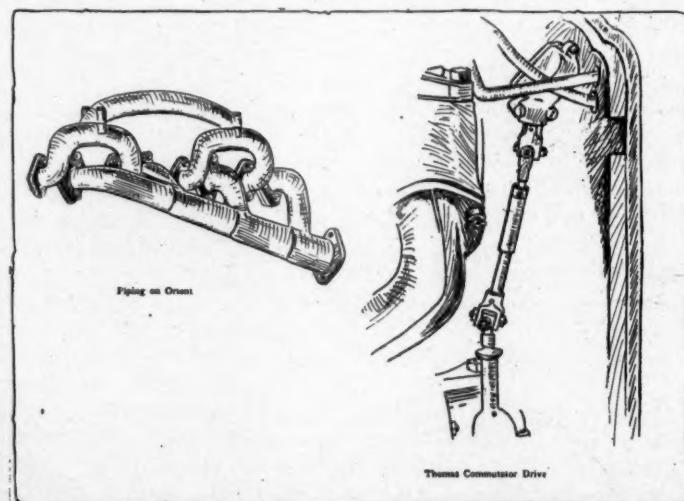
R. E. Olds' Reo radiator is a multiple arrangement resembling

in principle a stack of flat hollow boxes piled one on top of the other, sixteen in all being used, and with a connection between the top one and that beneath it at one end, other connections between the adjacent under ones at alternate ends, so that the water can flow from the top to the bottom passing in series through all of the sixteen parts in a zig-zag course. One of the units is illustrated. It is a bank of four tubes made from piping with a diameter of $\frac{1}{2}$ inch by flattening the same. The four pipes are soldered at each end into a bronze header, which has four corner holes for stand bolts used in coupling the sixteen of them together, and has on the upper side of one header an opening for the water to enter and a similar opening on the under side of the opposite header for the water to pass out to the next lower bank of four tubes. One bank rests horizontally on top of that below it. Cooling fins, as shown, are used. In this radiator should one set of banks become injured it can be removed, leaving the radiator with only fifteen banks but as efficient as before, except for the reduced cooling area.

Jackshaft Bearings

The Crawford company makes use of double side chain drive and has a neat point in its makeup in having the brake drum and rear road wheel hub made in one piece. The drum might more strictly be termed a brake wheel, the rim being supported by spokes. For simplicity the sprocket for the chain drive consists of a toothed rim only, which is bolted in six or eight places to the side of the brake wheel rim, on the side next to the road wheel. This concern further uses an adjustable swinging bearing brackets on the ends of the jackshaft. On the frame piece is riveted a heavy bracket, so that the bearing point of the shaft is thrown outside of the frame piece. The bottom of the bracket is made with three eyeholes for receiving the cross bolt holding the swinging bearing bracket in position. This bearing bracket is split at the bottom and has an adjusting bolt so the bearing cages can be clamped into position. The swinging bearing is advocated by this concern on the ground that should the frame be forced out of alignment the same will be cared for in this method. The jackshaft, being secured to the differential in the gear box, has no end movement when the bracket swings.

Keeping the hot exhaust pipes well removed from the cylin-



der sides is a problem that has been ably wrestled with by many makers. Particularly true is this with reference to air-cooled motors, where the heat of the pipes is often greater than in water-cooled motors. The Orient four-cylinder motors have a novel inlet and exhaust piping scheme carried on one side of the motor. The exhaust pipe is of large diameter and extends downwardly from the front cylinder to the bottom of the dash, its diameter increasing all of the way, and is joined by a separate branch from the three rear cylinders. The pipe is well removed from the cylinders. The inlet piping is an inverted U piping for each pair of cylinders with an arched piece above the U pieces connecting them with the carburetor which is carried well above the cylinders.



Packard Motor Car Co.—Packard

A Packard chassis, a touring car, a runabout and two cars with limousine and landauet bodies comprise the exhibit here. The Packard motor this year has four vertical cylinders cast in pairs, developing 24 horsepower, nominal French rating, claimed to be equal to 45 horsepower, more than 40 per cent increase over last year. The cylinder castings are machined and finished in the Packard shop, although made in France. Pistons and piston rings are ground and the cylinder barrels lapped. The inlet and exhaust valves are mechanically operated and are interchangeable, being on opposite sides of the motor. Cams, shafts and all cam mechanism are inside the crankcase, and the gears operating the camshafts, water pump and magneto are enclosed in an oil-tight compartment. The aluminum crankcase is in three parts. The cylinders and camshafts are carried in the upper part, which forms a base for the magneto and water pump, and heavy arms extending at each end support the motor directly from the main frame. The crankshaft bearings, heavily ribbed to insure rigidity, are carried on the upper and central pieces. The lower piece forms a pan to hold the oil. For the 1,000-mile type of carburetor, which is single jet, it is claimed that it gives more direct and freer passage, which causes less resistance to the flow of the mixture to the motor and combines the use of an improved automatic auxiliary air valve and hot water jacket, insuring correct mixtures at all motor speeds and under all weather conditions. The Eiseman system of ignition is employed, the current being furnished by a low-tension magneto and transformed in a single non-vibrating coil. For the purpose of starting the motor from the seat and as a reserve ignition outfit a storage battery with a single vibrator coil is carried. Oiling is done by the Packard automatic force feed and splash system, a single gear-driven plunger delivering an equal quantity of oil to both front and rear crankcase compartments through separate sight feeds on the dash. An automatic valve distributes the oil to first one compartment and then the other. A tubular radiator, with gear-driven gear pump and belt-driven fan is the cooling system. A small throttle lever and spark control on top of the steering wheel and an accelerator pedal at the base of the steering column form the control. Instead of a centrifugal governor an automatic hydraulic governor is used. The internal expansion band clutch, 2 inches larger in diameter and $\frac{1}{2}$ -inch wider in the face than heretofore is fitted. The transmission is by sliding gears, with three for-

ward speeds and one reverse and direct drive on the high speed. Hess-Bright ball bearings throughout are fitted. The drive is by bevel gear. There is a worm and segment steering apparatus, fitted throughout with ball bearings. More road clearance is had by the front cross rod being raised $3\frac{1}{2}$ inches. The front axle is made of cold drawn seamless steel tubing, reinforced, and with massive drop forged steering yokes. The rear axle is embodied in the housing of the driving and transmission gears and is fitted with extra heavy truss webs. There are four brakes, all of them 2 inches larger in diameter and $\frac{1}{2}$ -inch wider in the face than in 1905. There are also four semi-elliptic springs, the front ones 40 inches long and the rear ones 56 inches. Pressed cold rolled steel of deep channel section and tapered from the central portion toward the ends is used in the frame. The stamping of the gusset plates integral with the side bars does away with many joints and rivets. The wheels are 34 inches of the heavy artillery type, the front wheels running on Timken roller bearings and the rear wheels keyed solid to the driving axles, which run on Hess-Bright ball bearings. The tires are 34 by 4-inch in front and 34 by $4\frac{1}{2}$ -inch in the rear. The tread is $56\frac{1}{2}$ inches and the wheel base 119 inches.

George N. Pierce Co.—Pierce Arrow

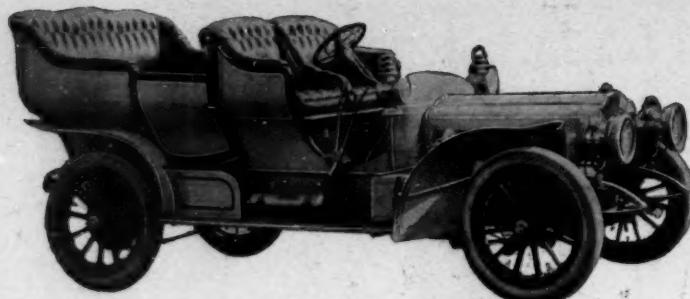
The 8-horsepower stanhope, a 28-32-horsepower touring car and a 40-45-horsepower machine comprise the Pierce line, with the Pierce Great Arrow the leader. Direct drive on the high speed is now used. The inverted arched front axle has been replaced with an I-section bronze one. In the carburetor the float is fastened to the stem and a ball valve used instead of a needle one. The mixing chamber is a little higher. A new design in Pierce bodies is also noticed, cast aluminum being used almost exclusively. The front seats are of the individual type and in the rear is accommodation for five passengers with baggage. The wheel base is 109 inches. The four-cylindered Pierce motor has separately cast cylinders, the castings being flattened on the sides to admit of the cylinders being placed closely together. The bore and stroke on the 28-32 are $4\frac{1}{4}$ and $4\frac{1}{2}$ and on the big one 5 and $5\frac{1}{2}$ inches. Each cylinder is an integral casting with the exhaust valves in ports on one side and the inlets in similar ports on the other side. The valves are interchangeable. The crankshaft is a solid steel forging with ground bearings throughout, running in adjustable bronze bushings. The commutator is of



TOURING CAR

THE TWO PACKARD CARS

GENTLEMEN'S RUNABOUT



THOMAS FLYER, 50-HORSEPOWER

the roller type, placed on a vertical shaft between the third and fourth cylinders, being driven through bevel gears by the cam-shaft. A rotary pump driven by a gear meshing with the exhaust camshaft gear maintains the water circulation. The Pierce steering column consists of three concentric tubes. In the transmission gear it is noticed that direct drive on high speed is used instead of the transmission set having the propeller shaft to the rear axle in line with the counter shaft of the transmission, so that on all speeds ahead the drive is transferred from the main to the counter shaft. Now it is possible to run the car most of the time on high speed. Hess-Bright ball bearings are used throughout in the transmission. There are three forward speeds and one reverse, and the cone clutch is leather-faced. The brake drums on the rear wheels serve for both the regular and the emergency brakes, the inside of the drums being used for internal expansion brakes, which are foot-applied, and for general use, and the outside for the lever-applied emergency brakes. In both sets coil springs normally hold the bands away from the drums. Both sets are interconnected with the clutch, the latter being disengaged with brake application.

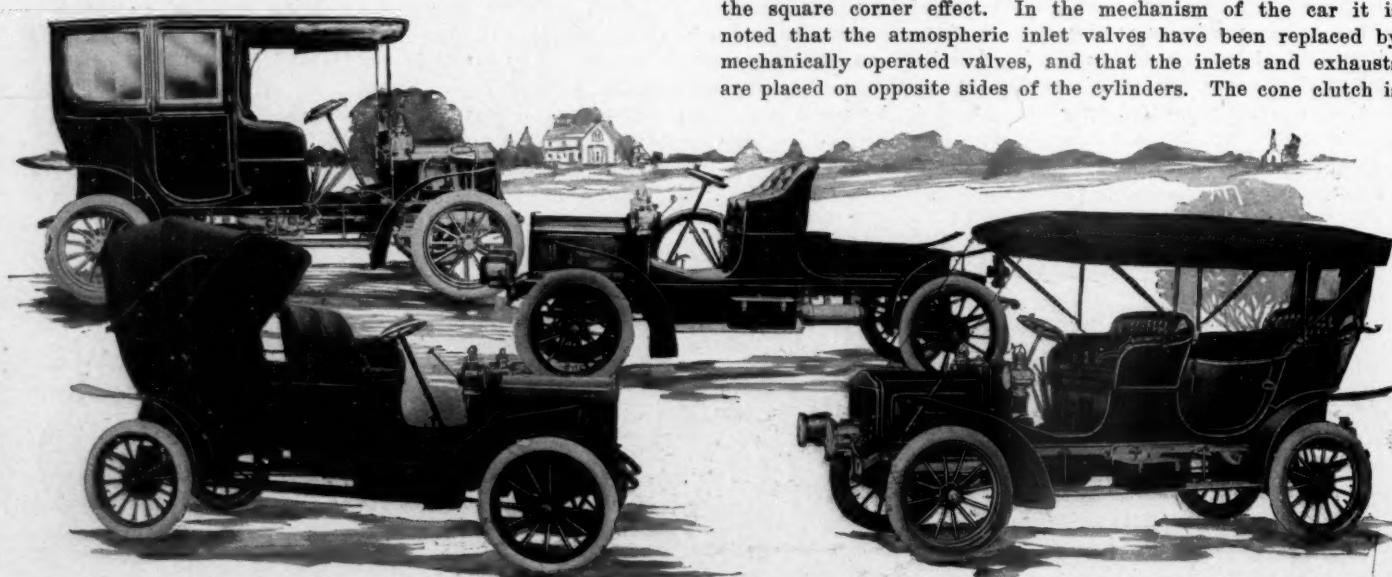
White Sewing Machine Co.—White Steamer

Occupying a space 44 by 29 feet, the White family is most liberally represented, not fewer than eight cars being shown. The only difference in the various types of model F is in the bodies, the chassis being identical. On the stand are a touring car with a canopy top, a touring car with a cape top, a touring car with a victoria body, a runabout, a limousine, an imperial victoria, a landauet, and an extension landauet. Of course the main interest of the spectator is centered on the White generator, which is radically different from any other variety of generator, it being unique in that the water is at the top and the steam at the bottom, just the opposite to most other types. There are eleven helical coils of steel tubing superimposed upon one another in the White generator, which is located in the center of the chassis and

enveloped by an asbestos insulating casing, which is in turn surrounded by an annular flue through which the products of combustion are conducted downward. The coils are joined in series, with the burner located below the coils, which offer a large heating surface. The water or steam cannot pass from one coil to the coil below it without being first forced up to a level with the top coil and then passing down again. This prevents water from descending by gravity and renders the circulation down through the generator dependent upon the action of the pumps. The steam pressure is automatically kept within close limits by a regulator of the diaphragm type, the White being designed to operate at a steam pressure of about 375 pounds. When this is exceeded the regulator bypasses the water from the pumps so that it is no longer fed to the generator. The regulator again acts and water is again fed to the generator when the pressure drops below the 375 mark. There is a compound engine mounted vertically in front under the bonnet, with the high pressure cylinder nearest the dash. The Stephenson link type of valve motion, actuated by a set of four eccentrics working on the crankshaft, is used. Water is supplied to the generator by two power pumps which are operated by an eccentric, through a rocker arm, located between two sets of valve eccentrics. Ordinarily the engine is always a compound, but there is a simple device, which is operated by a pedal, which admits high pressure steam to both cylinders and which is used for starting or for overcoming unexpected obstacles. The low pressure cylinder exhausts the steam directly into the condenser, which consists of vertical finned tubes which form the front of the hood. Steam that is not condensed escapes into the air through an exhaust pipe ending below the condenser. There are no perforations in the base of the burner, so only air mixed with gasoline vapor from the induction tube is admitted. This not only protects the fire but makes it almost impossible to blow out the flame. An air pump attached to the engine maintains a moderate pressure in feeding the fuel to the burner. The pilot light heats the vaporizer and lights the burner. Power is transmitted from the engine to the rear axle by means of a drive shaft and bevel gears. The rated horsepower on model F is 18, the wheel base is 114 inches. The seating capacity of the touring car, victoria and landauet is five persons, the runabout two, and the limousine and extension landauet seven, drop seats being provided for extra passengers.

E. R. Thomas Motor Co.—Thomas

As the eye falls on the 50-horsepower Thomas Flyer it catches the same unique style of body that was so prominent last year. But this year this has been modified somewhat, the top of the back seat being lower, which eliminates that heavy appearance associated with the very high back. Easy corner curves replace the square corner effect. In the mechanism of the car it is noted that the atmospheric inlet valves have been replaced by mechanically operated valves, and that the inlets and exhausts are placed on opposite sides of the cylinders. The cone clutch is

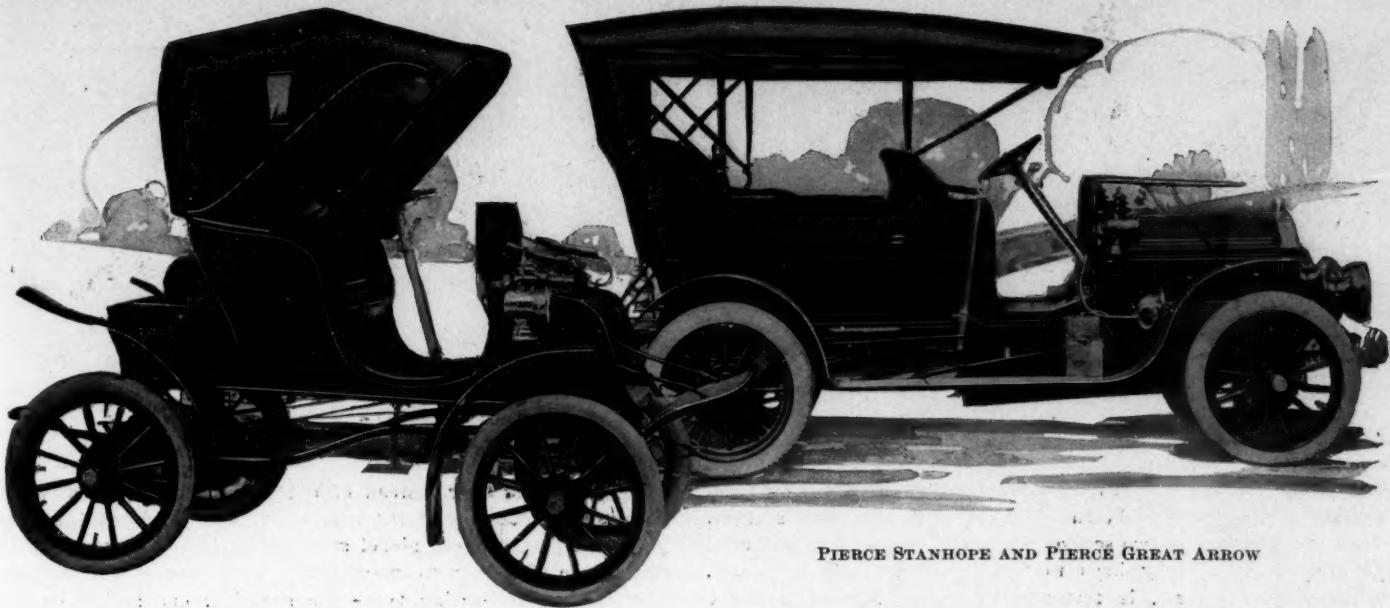


LIMOUSINE

VICTORIA

THE WHITE FAMILY

RUNABOUT TOURING CAR



PIERCE STANHOPE AND PIERCE GREAT ARROW

missing and instead there is one of the disk type. Four forward speeds are used and the wheel base has been increased to 118 inches instead of from 104 to 110 as used last year. Extra long springs are used and four brakes are fitted. In the way of old features retained there are the chain drive, hollow metal dash and ample carrying compartments. The motor is now carried direct on the main frame side pieces which are offset in front for this purpose as well as to increase the turning angle. This does away with the subframe. Tubular axles are not used. Instead they are of the drop forged I-beam section and made of steel that has been specially treated to stand shocks, stresses and strains. The rear axle is one piece, including the spring seats, which eliminates the use of brazed spring seats. Hess-Bright ball bearings are fitted and the car weighs approximately 3,000 pounds. Each cylinder in the motor is made in a separate casting. Such parts as the inlet and exhaust valve ports, cylinder heads and water jackets form an integral casting. All valves are interchangeable and are placed in the bottom of their respective ports, being removed through openings in the valve port heads. Both camshafts are encased within the crank chamber and are driven by external gears of the combination type, having very wide faces and protected by an aluminum shield. The crankshaft, a drop forging, ground to a finish all over, runs in long plain bearings fitted with chain oilers. The addition of practically a third to the radiating surface and increasing the service of the water pump three-fold have increased the cooling facilities, but little change is noted in the ignition system. The single unit coil and jump spark system, with either dry cells or storage batteries, is fitted, although magnetos may be used. The disk clutch is a metal-to-metal, three-plate device, and the four forward speeds in the sliding gear case is a feature which has long been prominent in high grade European cars of both French and German build.

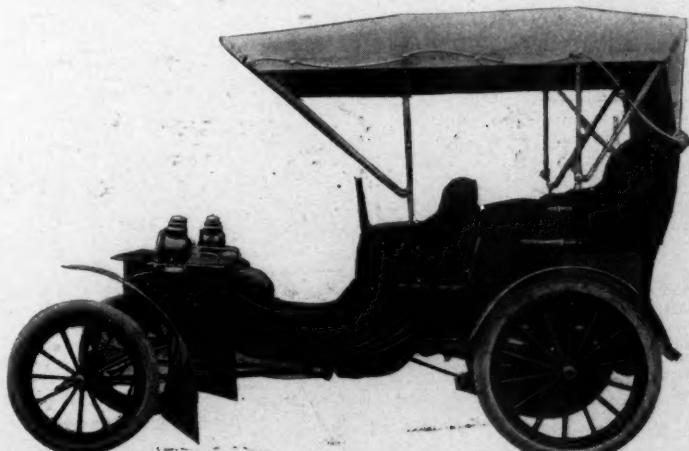
Duryea Power Co.—Duryea

Charles E. Duryea has two cars for 1906—a folding rear phaeton and a side entrance tonneau machine, the former being his leader. This one weighs 1,150 pounds and is fitted with the Duryea triple-cylinder engine. Other Duryea ideas are the one-hand control, the lightly loaded front wheels, the curved line bodies and the large rear wheels, and in this phaeton there is the folding rear seat, which meets the needs of the average family. This rear seat has no loose or detached pieces to get lost or rattle or to require time in folding or opening. It is ready for use when lifted and is closed as easily as shutting a door. It is easy of access from either side, flexible doors or curtains being provided for muddy weather. Magneto ignition, make-and-break spark and a compact engine and transmission gear on the same shaft are among the other features. The other model has been a

standard style with Duryea for several years, but one not pushed because of the attention given to the smaller models. This style is distinguished by the graceful curves of the body, large rear wheels and a slightly elevated rear seat. Besides giving a good clearance above the ground, the rear wheels are claimed to secure easy riding. The clearance and the high seat are believed to mitigate the dust nuisance. This model is equipped with a 5 by 5-inch motor of special construction. The triple-cylinder form is retained, the motor being up above the sills of the vehicle, under the driver's seat, where it is out of the way, leaving the front for parcels or for a seat. It is also asserted that no dirt or mud can reach the mechanism here. A short single chain transmits the power to a live rear axle. An improved transmission gear with larger surfaces gives two speeds forward and reverse, but because of the large power and flexibility of the motor, practically all driving is done on the high speed. The total weight of this model is 1,400 pounds. The single lever control is also used.

H. H. Franklin Mfg. Co.—Franklin

Of the four models shown by this Syracuse firm one of them—model G—is entirely new. E is the light roadster, which differs slightly from last year, whereas D greatly resembles the 1905 large touring car. H is a six-cylinder machine with disk clutch and sliding gear transmission. The new model—G—has four cylinders placed longitudinally, and has sliding gear transmission and multiple disk clutch. Air cooling is still the feature of the Franklin motor, with all valve cages provided with flanges. Probably the leading feature is the use of a sliding gear transmission and multiple disk clutch. The latter is placed within the flywheel and is small enough to allow of the flywheel spokes



DURYEA'S LATEST MODEL

MARK XLVI



MARK XLIV

THE COLUMBIA GROUP

MARK XLVII

outside of it acting as fan blades for drawing the hot gases from around the motor. Eighteen disks give the friction surface. They are arranged in two sets of nine each, one set being secured at the outer edges by keys to the flywheel. The other set, alternated with them, is fastened at the centers to a sleeve on the transmission shaft. One set of disks is made from phosphor bronze and the other from crucible steel. The clutch works in oil. One of the other Franklin features is the sliding gear transmission, which is carried in a compact aluminum casing, which is bolted at the front and rear to two cross angle pieces of the frame. It gives direct drive. The main and countershafts of the gearing are in the same horizontal plane with the former, forming an axial connection between the clutchshaft and the cardan shaft to the rear axle. The countershaft lies to the right of the main one. The entire case is open on top, eight screws being used in retaining the cover. With the exception of type E all the cars are shaft-driven. No change in the position of the motor is noted, it being placed lengthwise and covered by a hood in front. The engine bases are made from aluminum castings which are fitted with two base plates held in position by cap screws. The timer is of the roller type and attached direct to the end of the camshaft. The thickness of the cylinder heads has been decreased and the entire thickness of metal in the cylinders made uniform. A slight change is noted in that the inlet and exhaust valve cages, still at the top of the cylinders, are now flanged with radiating ribs, the hot gases

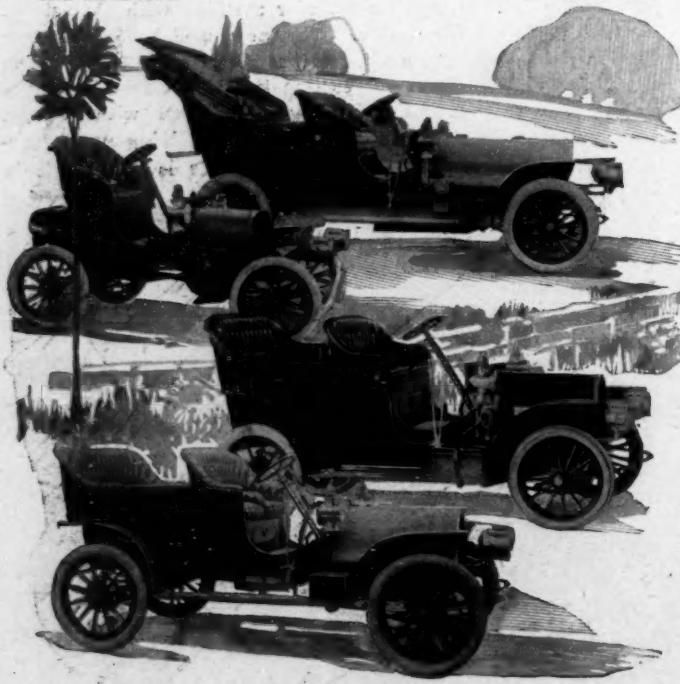
being conducted over instead of out through the cylinder head. Chrome steel bearings of the silent ball type are fitted, all other parts being made from nickel steel having a tensile strength of from 54 to 68 tons per square inch. Three brakes—of the outside band double-acting type—are supplied, one acting on the transmission brake drum controlling the propeller shaft and the other two on the rear wheels. The rear axle is of the live type and is bevel gear driven. The carburetor is of the automatic float feed type. As the air passes by the nozzle it vaporizes the gasoline which comes through the needle valve and a passage to the nozzle. The gasoline is regulated by the needle valve and the amount of air and vapor going to the engine is controlled by the throttle valve, which is connected to a governor. The throttle valve is also connected with a by-pass valve. When the throttle valve is nearly shut so that the engine will just run, the by-pass valve is shut and all air passes by the nozzle. When the throttle valve is open the by-pass valve is also opened so that extra air, which does not pass by the nozzle, may be furnished the mixture. A spring serves to steady the needle valve and keep it from unscrewing. The needle valve is connected by an universal joint to a stem with a handle which is easily reached from the seat and provides easy adjustment.

Electric Vehicle Co.—Columbia

Most complete is the Columbia exhibit. Gasoline models comprise two of the mark xliv type, with cape top; one mark xlvi, with cape top; mark xlvii, with cape top, and mark xlviii, with limousine body. In addition there is a chassis of the xlvi, highly finished in lead and polished steel, with natural wood wheels, almost identical with the one shown at the Paris show. There is also a chassis of xlvii. In the electric exhibit there are six models—lx, a runabout; lxi, a victoria phaeton; lxviii, a brougham; lxviii, a landaulet; lxviii, a hansom, and lxviii, a C-spring victoria. The new gasoline model—mark xlvi—is a 24-28-horsepower car with room for four passengers, although five can be carried in a pinch. Make-and-break low-tension ignition with current from magneto; valves placed side by side in the bottom of the ports on the left side of the motor; flywheel spokes serving as a fan, three-speed sliding gear set, shaft drive and floating type of rear axle are among the most prominent features of this new model. I-section front axles are also fitted in this as well as in the large touring car. There is a 98-inch wheel base, a clearance of almost 10 inches, and the weight is 2,250 pounds. Semi-elliptic springs, both front and rear, and a three-point suspension for both the motor and the gear box are also on this model. Roller bearings are used on the road wheels and in the rear axles on all the Columbias, but special babbitt carries the crankshaft and phosphor bronze is used in the gear boxes. On this car there is a departure from Columbia practice in the crankshaft. It is made from a special carbon and nickel steel and from a slab of cold metal instead of being drop forged, making the cost of production several times that of a drop forged shaft. Placing the valves in ports on the left is some-

THE ROADSTER

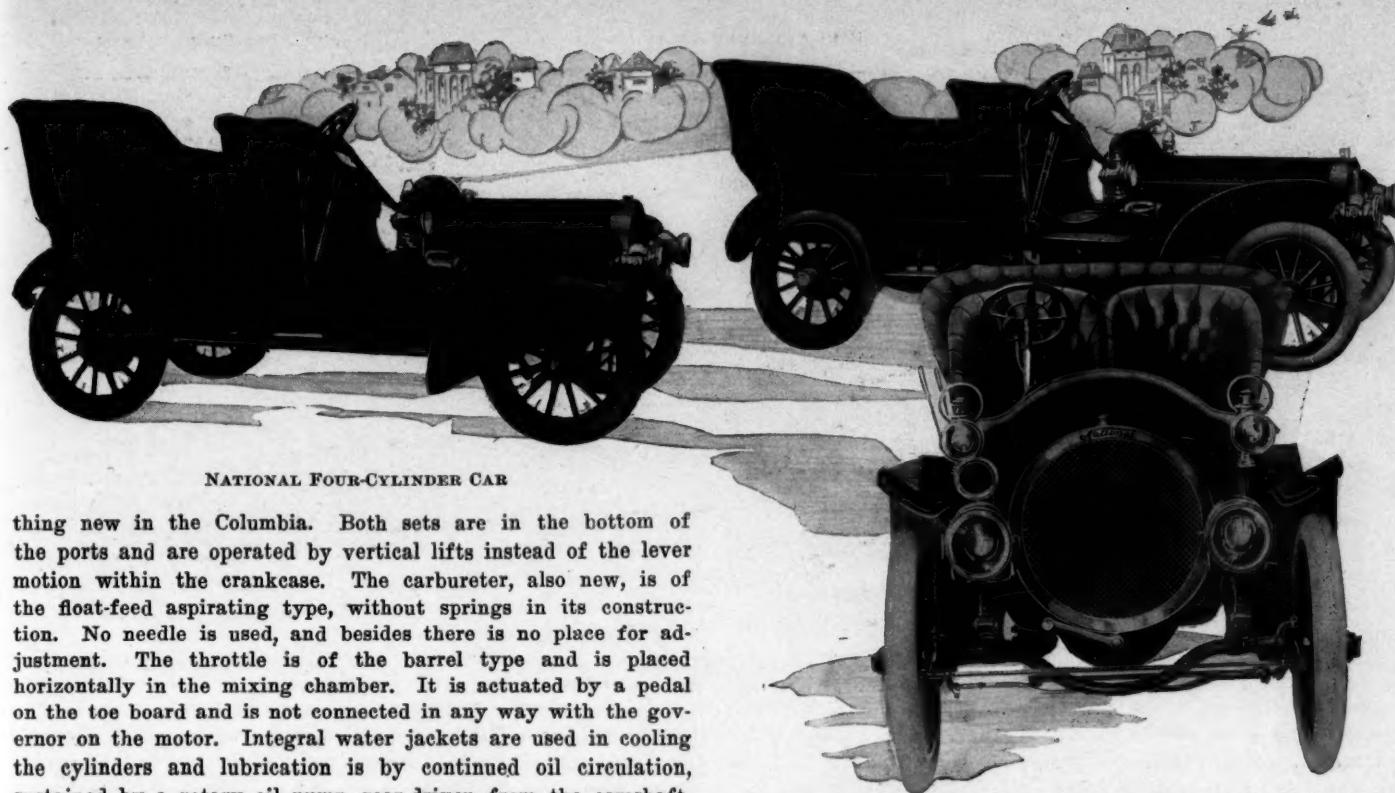
SIX-CYLINDER



MODEL D

FRANKLIN LINE

MODEL G



NATIONAL FOUR-CYLINDER CAR

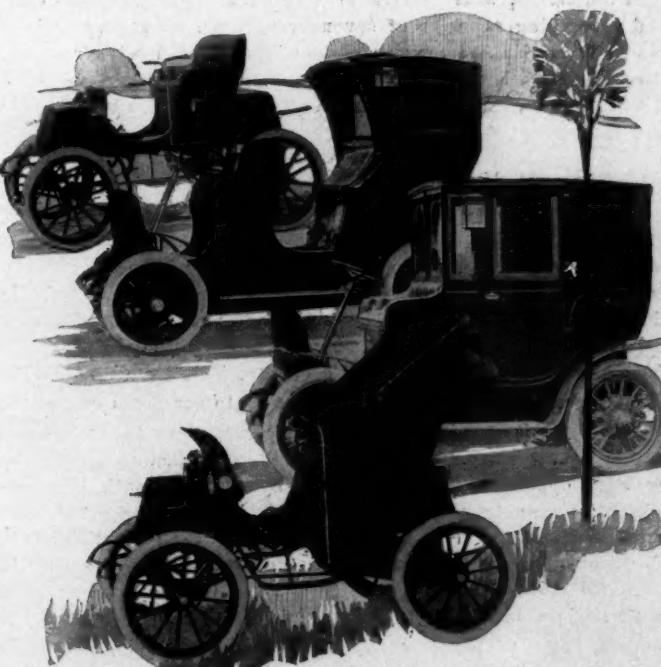
thing new in the Columbia. Both sets are in the bottom of the ports and are operated by vertical lifts instead of the lever motion within the crankcase. The carburetor, also new, is of the float-feed aspirating type, without springs in its construction. No needle is used, and besides there is no place for adjustment. The throttle is of the barrel type and is placed horizontally in the mixing chamber. It is actuated by a pedal on the toe board and is not connected in any way with the governor on the motor. Integral water jackets are used in cooling the cylinders and lubrication is by continued oil circulation, sustained by a rotary oil pump gear-driven from the camshaft. On this car the clutch is a small, external, leather-faced cone one. Three speeds and one reverse are given, in the obtaining of which two sliding units are used. A telescope shaft couples the gear box with the live rear axle and has the pinion on its rear end contained in a housing. Xliv has 18 horsepower, with an opposed motor carried crosswise beneath the hood and shaft drive. Xlvii is 40-45 horsepower, has a lathe-made crankshaft, new carburetor, Mercedes type of hood and other features. This car remains equipped with jump spark ignition with current from storage batteries, the four speed and reverse sliding gear transmission remains, as does the three-way gate scheme of operation, and double side chain drive. Looking over the motor such points as the securing of the spark plugs into the cylinders by a breech-lock mechanism so they can be instantly removed, the use of one spring for each pair of valve stems and the placing of one set of valves in the tops of the ports remains. A noted change is the placing of the emergency brake lever back beside the change speed lever, instead of the placing it at the front of the footboard. Without doubt, the leading electric vehicle exhibited by this concern is its new extension front brougham, a pleasure vehicle, well suited for city purposes and fitted with 4½-inch pneumatic tires in rear and 4-inch pneumatics in front. The motor used, intended for high speed purposes, is series-wound for 80 volts, 55 amperes, and has four forward and three reverse speeds. The speed range is from 4 to 18 miles per hour. For controlling purposes a steering wheel similar to that used on a gasoline machine is fitted, and beneath the wheel is placed the controller handle. For emergencies a foot-operated switch is fitted and regular emergency brakes are added. The former are internal expanding brakes working within drums on the rear hubs, foot applied, and the emergencies are external bands operating on the outer surface of the same drums. The enclosed compartment accommodates four adults and is fitted with every modern convenience. Other electric pleasure machines made by this concern and exhibited are runabout, victoria phaeton, landaulet, hansom, and victoria with C-springs.

National Motor Vehicle Co.—National

On the National stand are found a 35-40-horsepower model D touring car, with a polished chassis of the same car; a model E 50-60-horsepower touring car equipped with a six-cylinder engine, and a model E with an aluminum limousine body. Noticeable on these models is the system of double connecting rods to the steer-

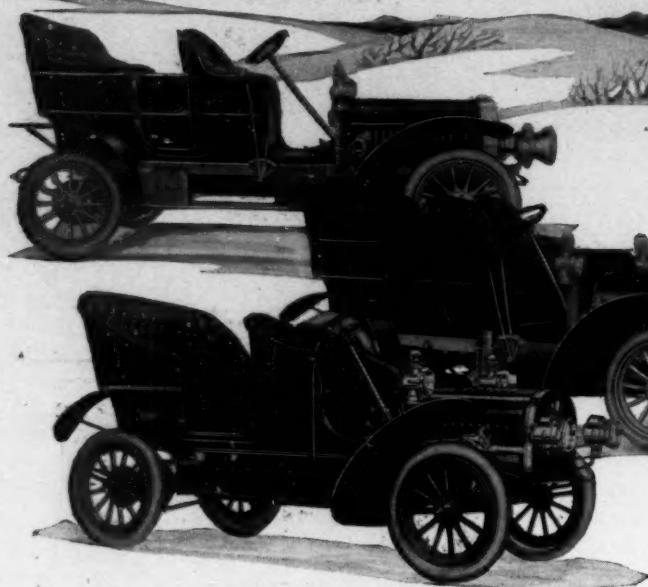
SIDE AND FRONT VIEWS NATIONAL SIX-CYLINDER

ing knuckles and the peculiar construction of the transmission which places both the main and countershaft in the same vertical plane. Each shaft is mounted on annular ball bearings. The rear axle is so constructed that the driving gears can be examined, adjusted or removed without taking off the rear wheels. The axle casing, instead of the axle, supports the weight of the car, the inner axle serving only as a driving shaft, transmitting power from the differential to the wheels by means of a dog clutch which engages the outer edges of the hubs. A triple ignition system is secured by the use of a set of dry cells, a set of storage batteries and a dynamo. The dynamo is found at the base of the dash, projecting through the floor at the driver's feet near the flywheel, from which it is driven by a friction governor attachment. Model E has the six-cylinder engine, the vertical cylinders individually mounted under the bonnet, with gear



A GROUP OF COLUMBIA ELECTRIC CARS

FOUR-CYLINDER CHAIN DRIVE



FOUR-CYLINDER SHAFT DRIVE



TWO-CYLINDER SURREY, TYPE ONE



TWO-CYLINDER SURREY, TYPE THREE

pump, mechanical valves, direct drive, gear-driven commutator, divided aluminum crankcase and interchangeable parts. A self-contained, leather-faced, spring cushioned, aluminum cone clutch is fitted, the transmission being of the sliding gear type, with three speeds forward and a reverse and gears running in oil. The drive is bevel gear through a ballbearing propeller shaft with flexible joint to the rear axle. The latter is of compound construction, the inner axle being used only as a driver, the wheels turning upon double annular bearings on a hollow axle. Annular bearings are used throughout and the oiling is by a seven-feed Hill precision oiler with leads to the engine, transmission and rear system. Two systems of brakes are used. There are four internal expanding metal-to-metal hub brakes, a lever applying the main brakes in 15 by 1½-inch drums, while a pedal applies the secondary brakes in 11 by 1½-inch drums. Either set releases the clutch. The frame is of pressed steel 5-inch channel section, with the subframe riveted and braced. The steering is by irreversible worm and segment gear. The bonnet is semi-cylindrical and the control is had by means of a single lever at the driver's right. The wheel base is 121 inches and the body of the car is of cast aluminum, with removable high back tonneau, side entrances and a carrying capacity of seven passengers, all facing forward. Model D carries five passengers and in general detail closely follows E. Its wheel base is 104 inches. Both models use 34 by 4-inch tires and have wood artillery wheels, twelve spokes front and rear.

Thomas B. Jeffery & Co.—Rambler

Five models have been added to the Rambler family this year, making seven in all. The two surreys are the ones carried over, one of them being a type 1, 18-horsepower, side-entrance, five-passenger car, with a two-cylinder opposed motor, and driving through a two-speed and reverse transmission, with single chain drive, and the other, type 2, a 20-horsepower machine, with drive from the transmission shaft to a countershaft by a single chain and from the countershaft by side chains to sprockets on the rear hubs. Type 3 of the new lot greatly resembles types 1 and 2, except that the wheel base is 100 inches. A 20-horsepower two-cylinder opposed motor is placed lengthwise beneath the body, with the planetary gearshaft axially in line and final drive through single chain to a sprocket on the spur gear differential. The runabout is two-cylinder and rated at 10-12 horsepower, with standard motor and transmission parts and single chain drive. Most noticeable in the Rambler family is that three of the 1906 models have vertical four-cylinder motors, with transmission through a sliding gear set. Type 14 is a 20-25-horsepower light touring car, with cylinders having a bore and stroke of 4

RAMBLER LINE FOR 1906

FOUR-CYLINDER LIMOUSINE

and 4½ inches respectively. Types 15 and 16 have 5 by 5½-inch cylinder measurements, with 35-40 horsepower. Type 15 is a five-passenger, side-entrance touring car and 16 a limousine with the same chassis as is found on the touring car. Shaft drive is used on type 14 and double chain drive in 15 and 16. Ball bearings are still used on the road wheels, and on the four-cylinder models the vertical flat tube type of radiator is used. Because of the shaft drive in the 20-25-horsepower model there is a slight difference in frame construction, a subframe, fastened in front and rear to cross pieces, being used. Three-point suspension of the motor and gearcase are features here. The crankshaft is a three-bearing drop forging, ground to finish, with hand-scraped bearings. The new muffler is fashioned on cylindrical lines, being of medium diameter but very long. It is carried lengthwise beneath the frame at the left, and the interior of the cylinder is divided into compartments of equal dimensions by a series of cone-shaped plates arranged in pairs, two forming each partition. Between these two plates is a space through which the gases pass from one compartment to another. Except for size the two four-cylinder motors are practically similar, the four cylinders being of separate castings, with the valves placed side by side in the heads, which does away with the use of valve ports. Overhead valve levers of the walking beam type, with similar ones within the crankcase in connection with the camshaft, operate the valves. One of the features is the ease with which the valves or the camshaft can be removed and get-at-ability of the crankshaft bearings and connecting rods. Special nickel babbitt, with grooves for the distribution of lubricant, is used. The cylinders, after being ground to a finish and assembled, are polished to a mirror finish by being put on a testing stand and run by steam power, crocus and oil being used. The pistons are of the straight side and flat top style and each carries three sets of double compression rings—two above the piston pin and one beneath. Four oil grooves on the bottom catch the splash. I-section drop forgings constitute the connecting rods, which are split at the top so they can be clamped on the hollow piston pins, which have their bearings in the pistons journals and are fitted with two oil holes in each journal, allowing the oil to enter the ends of the pins and flow toward the center into the bearing. End movement in the pin is prevented by a spring ring in a groove in the piston. The end of the piston journal being cup-shaped, into which a steel ring is sprung, the cylinder walls are not scratched should the connecting rod become loosened. In the ignition system Rambler-made spark plugs are placed angularly in the sides of the cylinder heads, below the inlet valves, the electric current being supplied from a storage battery, supplemented by dry cells. The commutator

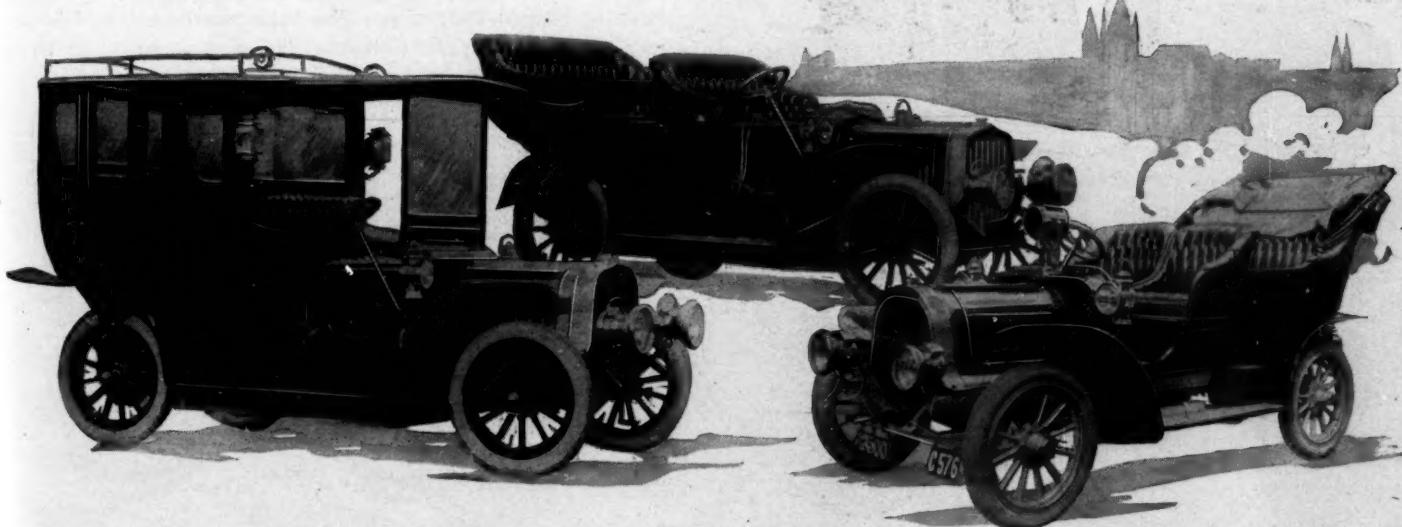
is beneath the center of the dash and slightly above the foot-board. The four wire terminals are not moved in advancing or retarding the spark. There is no separate spark lever and consequently the spark cannot be shifted without affecting the throttle control.

Pope Mfg. Co.—Pope-Toledo, Pope-Hartford, Pope-Tribune

It takes a lot of space to effectually exhibit the complete Pope family, but the colonel has plenty of it and the Pope-Toledo, Pope-Tribune and Pope-Hartford are all well displayed. Changes and improvements are many on the 35-40-horsepower Pope-Toledo, a new motor, with valves in the cylinder heads and the exhausts operated by overhead rocker arms being installed. There are the same automatic inlet valves and copper waterjackets, though, and the only change in the gear box is that an internal gear is used instead of clutch teeth in securing the direct drive. An interlocking scheme has been added. Besides there is a new body design and auxiliary brake, I-section axles and straight frame side pieces. In addition to this two other Pope-Toledo models are shown—a 20-horsepower side entrance car, in which the cylinders are cast in pairs, with integral waterjackets, instead of copper ones; and a 50-60-horsepower machine with the same motor and gear box design as are found in the 35-40. On this last named model the wheel base is 104 inches and four semi-elliptic springs are fitted. The subframe for carrying the motor and gearcase is kept, but, instead of offsetting, the main frame pieces alongside the motor, are made straight. The front axle is dropped in Mercedes fashion and carries Lemoine type of steering knuckles. The rear axle is dropped inside the spring seatings. The new motor is of the four-cylinder vertical type, with 4½-inch bore and 5¼-inch stroke. The wall parts of the cylinders are made separately, but the heads are cast in pairs, which is quite a novelty. Copper waterjackets are retained and the valves are placed side by side in the top of the heads. The automatic inlets are at the right and the exhausts at the left. The valve cages are made separate, with a ground fit in the cylinder heads. As they are slightly tapered, there is an easy dropping fit into the casting. Accessibility is the keynote here, it being possible to remove the valves by simply loosening a set-screw, which allows a bolt to be knocked out of position and the yoke to be lifted off. So far as general design goes there is no difference in the Pope-Toledo carburetor, which is carried on the inlet side close to the crankcase, connecting by a Y piping with the pairs of cylinder heads. The throttle is a horizontal sliding drum, with deep serrations at one end, through which the mixture passes to the inlet valve piping. Control is had by means of a thumb lever on the quadrant on the steering wheel. Another lever on the same place controls the spark. The gasoline flows to the float chamber by gravity, something new. Mechanical pressure is used in the oiling scheme, a six-feed Hill

oiler being carried on a motor arm close to the exhaust pipe. While the jump spark ignition system, with current supplied by storage or dry cells, is retained, it is possible to attach a magneto. The spark plugs are carried horizontally on the inlet side and on the exhaust side is the commutator, which is carried on a short shaft between the pairs of cylinders and driven through bevels from the camshaft. A centrifugal pump, carried low on the exhaust side and driven by a separate shaft, has been fitted in the water system. The crankcase construction is standard throughout. In the gear set it is noted that the main shaft and countershaft within the case are carried crosswise and that the inner ends of the two-part drive shafts of the differential countershaft within the casings form the main shaft of the gear box. The countershaft is parallel with and behind it. A sliding unit of gears is used in securing the speed changes. The Pope-Toledo type XII limousine is also displayed.

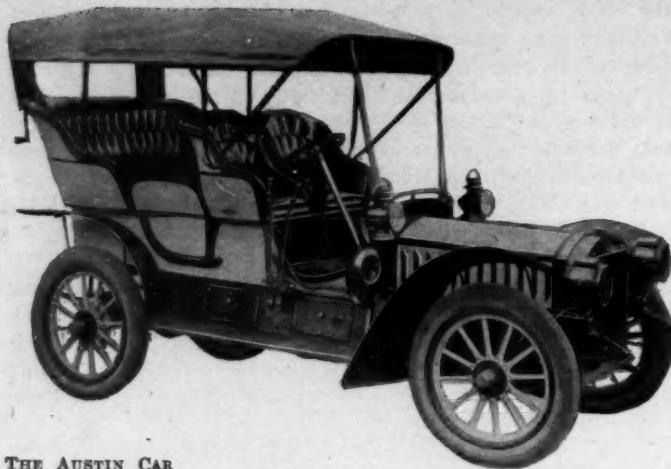
Plenty of new ideas are dished up in model 1 of the Pope-Hartford line. Instead of a two-cylinder motor, with the cylinders opposed beneath the bonnet, the 1906 product has a vertical four-cylinder motor, and the transmission of power through an internal cone clutch, a three speed and reverse sliding gear set and shaft drive to a floating rear axle. The cylinders are cast in pairs and with the waterjackets and heads forming a single casting. The valves are directly in the cylinder heads and actuated by overhead walking beams, driven from a single camshaft located within the crankcase, so valve ports are not needed. The valves are placed side by side in the heads, and a single exhaust pipe connects with each cylinder pair. The crankcase is of aluminum. Practically all the operating parts are on the right side of the engine, and little difference is noticed between this method of operating the valves and the usual way common with motors of this type. Jump spark ignition, combined with a commutator and secondary distributor, located on the right side of the motor between the second and third cylinders, is used. The commutator is inclined and is gear-driven by bevels off the center of the camshaft. Current is had from either storage or dry cells. The carburetor is of the separate float type, with the float chamber low on the motor side, and the mixing box, a horizontal cylindrical chamber with a vertical pipe at its rear end, connecting the induction pipe with the valves. The front of the bonnet is formed by a honeycomb type of radiator and a combined water tank. One lever at the right of the driver operates the three forward speeds and the reverse. The gear-shifting mechanism is different from the ordinary, the standard shifting rod attached by the yoke and collar to the sliding gears being done away with and in its place substituted a collar on the shifting unit—a yoke working on the collar. This yoke is connected to a toothed rack carried beneath a piece in the base of the case. Meshing with the rack is a pinion attached to a cross shaft running to the outside of the gear case,



POPE-TOLEDO LIMOUSINE

POPE-TOLEDO 50-60 HORSEPOWER CAR

POPE-HARTFORD



THE AUSTIN CAR

where it carries another pinion in mesh with a sector, which is in turn connected with the shifting lever through an arm. A forward movement of this arm on the sector gives a downward movement of the latter and revolves the pinions to the right. This moves the rack to the rear of the case for slow speed or reverse. For direct drive and second speed the arm is forced backward and the rack with the shifting unit carried to the forward-end of the case. Drive from the gear box is through a propeller shaft, with universal joints at each end.

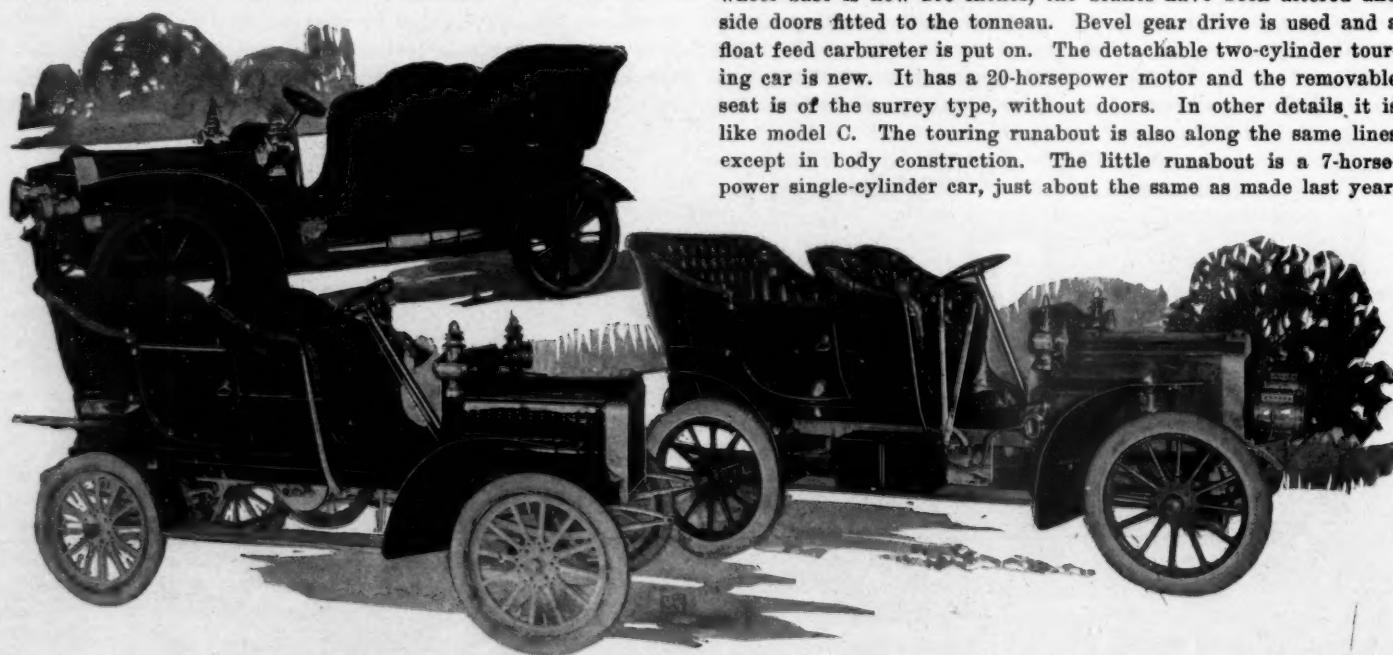
Austin Automobile Co.—Austin

While many of the 1905 features are retained for the new model of the Austin touring car, fresh ideas can be discovered by looking over the car as it stands in its booth. There is the same high power that distinguished the old model and the rear axle construction has been retained. Two complete and wholly separate ignition systems are used, one of them a high tension magneto and the other a dry or storage battery with coil and vibrator. Separate spark plugs are provided for each system. As each system is wired separately it is possible to use either or both. Decidedly new is the Austin anti-shock device. In the sliding gear the low speed and reverse have been made with the same ratio, but the original gear is lower on the reverse. The H-quadrant in the handling of the gear lever has been done away with, one lever having three vertical positions, with an added reversing lever rocking crosswise of the car. By this method, while the result is the same as with the H-quadrant

and sidewise moved lever, the possibility of selecting the wrong gear is done away with. There has been a slight increase of compression in the 1906 motor, but outside of this no change is noted here. The single aluminum clutch is fastened to a flanged hub, which is on a ball bearing on the rear end of the crankshaft, which is flanged. This has a short extension to the rear, there being a ball bearing here, which supports the steel disk hub. Solid clutch jaws, which are cut in the right side of the disk hub, engage similar clutch jaws cut in the left end of the clutch-shaft. These right end clutch jaws engage the change gear line shaft, the clutch engagements being surrounded by driven retaining rings. This model carries five persons and weighs 2,800 pounds. The wheel base is 109 inches and the tread 56 inches. The tires used are 36 by 4½ inches and there are brakes on the rear wheels and one on the driving shaft. The frame is of angle steel and 60 horsepower is claimed. There are four cylinders in the motor, which are upright in front. Shaft drive is used and the transmission is through a sliding gear set of the selective type. There is also fitted to the Austin cars new spring controllers which do not resist spring closing but retard spring recovery.

Northern Mfg. Co.—Northern

The Northern line, consisting of model K, a four-cylinder touring car; model C, a two-cylinder car; a detachable tonneau two-cylinder touring car; a touring runabout and the sturdy northern runabout, is shown in all its five types, the leader being K, the feature of which is clutch operated by compressed air, which is supplied by a pump installed on the motor. There is a 90-pound storage tank for air installed on the frame of the machine. In addition there is an air brake of the contracting band type, which is operated by an interlocking lever. The rating of the motor is 30 horsepower, the bore being 4½ inches and the stroke 5 inches, the waterjackets and cylinder heads of the cylinders are cast integral. The valves are mechanically operated and are placed directly in the heads of the cylinders. Jump spark ignition is had from a storage battery. The transmission is of the sliding gear type, furnishing three forward speeds and a reverse, and is on the rear axle. Direct shaft drive is employed. On the steering post handy to the steering wheel are small levers for operating the clutch, air brake, throttle and spark advance. Model C, the two-cylinder machine, retains its enclosed mechanism, and flywheel with fan blades cast integral, but the horsepower has been increased from 18 to 20 through the enlargement of the motor, the cylinders now having 5½-inch bore and 5¼-inch stroke. The wheel base is now 106 inches, the brakes have been altered and side doors fitted to the tonneau. Bevel gear drive is used and a float feed carburetor is put on. The detachable two-cylinder touring car is new. It has a 20-horsepower motor and the removable seat is of the surrey type, without doors. In other details it is like model C. The touring runabout is also along the same lines except in body construction. The little runabout is a 7-horsepower single-cylinder car, just about the same as made last year.



FOUR-CYLINDER AND TWO DOUBLE-CYLINDER JACKSON CARS

The trunnion body hanger is again the feature. The wheel base is 66 inches and the tread 55 inches. The engine is controlled by a foot throttle and spark lever, and the vertical valves are mechanically operated. The cylinders have a 4½-inch bore and 6-inch stroke. Planetary transmission is employed and the ignition is by jump spark from two five-cell batteries.

Jackson Automobile Co.—Jackson

Three models of the Jackson are exhibited—G, a 40-45-horsepower touring car; C, a 20-24-horsepower light touring car, and D, another 20-24-horsepower touring car. On the G the king of the Belgians style of body is fitted, with seating capacity for five. The motor is four-cycle four-cylinder, with the vertical cylinders arranged under the hood. The bore and stroke are 5 and 5 inches and the transmission is of the sliding gear type, giving three forward speeds and a reverse. Bevel gear drive is applied and a multiple clutch disk is used. A Hill precision oiler placed on the dash furnishes the lubrication, and the ignition is by jump spark, with current taken from a storage battery. The weight is 2,400 pounds, the wheel base 108 inches, the tread 56 inches and the tires 34 by 4 inches. Model C has the Belgian style of body with two side-door entrances and a detachable tonneau. Its seating capacity is five passengers and the motor is of the four-cycle two-cylinder opposed type, with the cylinders horizontally carried under the body. Bore and stroke are 5¼ and 5 inches and the Jackson planetary gear is the method of transmission. A cone clutch is fitted and the speeds are two forward and a reverse. The drive is by chain and the ignition system is by jump spark from dry batteries, with the coil on the dash. The weight is 1,750 pounds, the wheel base 90 inches and the tread 56 inches—and the tires 30 by 3½. Model D has the same type of body—Belgian—and carries five passengers, being fitted with a four-cycle two-cylinder motor with the cylinders crosswise under the hood. The bore is 5¼ inches and the stroke 5 inches. Planetary transmission is used and the clutch is of the multiple disk type. The speeds are two forward and a reverse and the ignition system by jump spark with a storage battery current. The weight is 1,900 pounds, the wheel base 100 inches and tread 56 inches. The wheels are 32 inches and of the artillery type, and 32 by 3½-inch tires are fitted.

Crawford Automobile Co.—Crawford

In place of model B, its touring car in 1905, the Crawford company has substituted a five-passenger car, although retaining its runabout. Both these models are shown on this stand. The new model carries five passengers and is fitted with a four-cylinder upright motor with 4½ and 4¾-inch bore and stroke, the horsepower being rated at 24-28. A selective type of transmission is fitted, which gives three forward speeds. This is in place of the individual clutch type used last year. Final drive through a pair of side chains connecting the sprockets on the ends of the jackshaft with those on the rear hubs is retained, though. In the transmission set, jackshaft and road wheels ball bearings are featured, and 6 inches have been added to the wheel base,

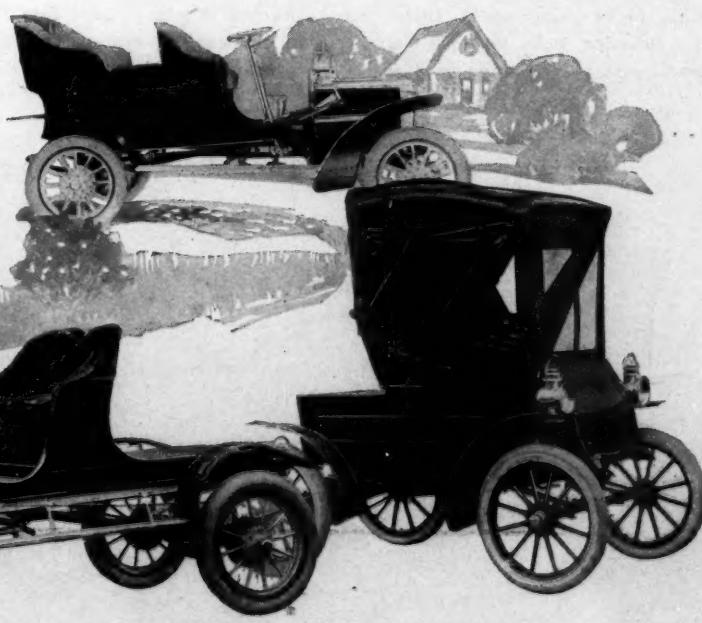


THE NEW CRAWFORD

making it 100 inches. The road wheels have been increased in size to 34 inches and fitted with 3½-inch tires. Deep section pressed steel sides are seen in the frame. There is also an angle iron subframe, which is brazed up to carry the motor and transmission. These are connected by a double universal joint. The forward end, having a long slip joint, allows of the clutch being easily detached for refacing. The clutch is of the inverted cone type, leather-faced, and operated by a foot lever. Two brakes operate on the rear hubs by a side lever, while two band brakes on the cross-shaft are operated by the foot. This relieves the differential, which is located in the gear box, from strain. Force feed lubrication is employed. Jump spark ignition, with standard coil on the dash, is used, and the control is by throttle and spark. The runabout is a 10-horsepower car, with the frame made of channel iron, riveted and brazed, with drop forged spring hangers, guard braces and wide gussets. The lubrication is of the force feed type, and the splash system is employed to care for the cylinders. A centrifugal gear-driven pump carries the water to cool the motor and the carburetor is of the positive lever float feed type. The steering is by wheel through a pinion and sector with connecting arm. There are three speeds—two forward and one reverse. The motor is of the two-cylinder vertical type, with a 4-inch bore and a 4½-inch stroke. The wheel base is 78 inches and the tires 30 by 3 inches.

Locomobile Co. of America—Locomobile

Two classes of trade are catered to in the two models exhibited, one of which is intended for those desiring a light car with medium passenger service, and the other is for those who have



NORTHERN LINE—DETACHABLE SURREY, TWO-CYLINDER RUNABOUT, TOURING CAR, ONE-CYLINDER RUNABOUT



15-20 HORSEPOWER

TWO LOCOMOBILE MODELS

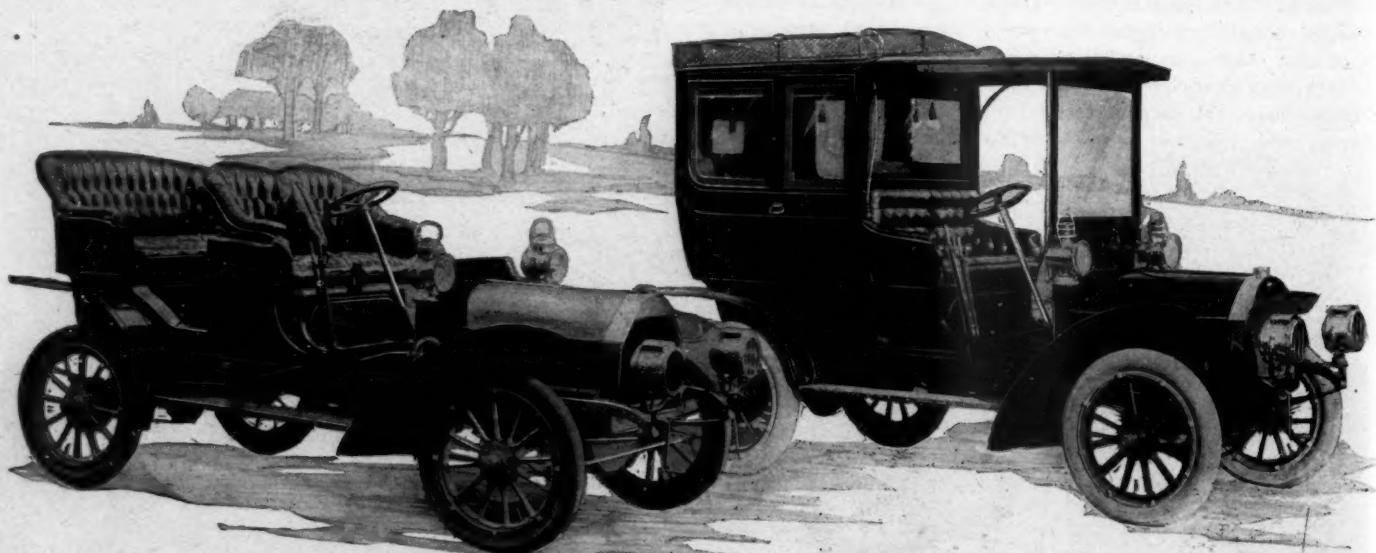
30-35 HORSEPOWER

use for a machine of the regular touring type. The former seats five passengers and is a 15-20-horsepower side entrance car, and the other carries seven and is 30-35 horsepower. Last year four models were made. On the lighter machine this year is used a regular four-cylinder motor with $3\frac{3}{4}$ -inch bore and $4\frac{1}{2}$ -inch stroke, while the other is $4\frac{1}{2}$ and $5\frac{1}{2}$ inches. The make-and-break ignition, with current furnished by a gear-driven magneto, is used on both models. Few changes have been made on the motors, these being found in the valve caps and mechanical igniters. Internal emergency brakes have been added, but the clutch and gear boxes remain the same. Not many changes are found in the running gear, although all parts have been materially strengthened. Plain bearings are used, the lubrication being secured through the axle stubs being in the form of grease boxes. On the smaller model there is a 93-inch wheel base, with 32 by 4-inch tires, while on the touring car is found 106-inch wheel base and 34 by $4\frac{1}{2}$ -inch tires. An aluminum apron on the under side of the chassis protects all the mechanism from mud and dirt. The motor is formed with four cylinders, cast in pairs, each having inlet valves disposed in integral valve ports on the right side and exhausts in similar ports on the left, two cam-shafts being used. Valves are removed by means of bronze screw caps in the tops of the ports, while a novelty is the fitting of drip cocks in the cylinder walls to facilitate draining the motor in cold weather. The crankshaft is a special drop forging, with its bearings ground and hardened. There is a slight taper on the pistons. Four compression rings are found above the wristpin, each being split diagonally and ground. A mechanical oiler, driven from the rear end of the exhaust cam-shaft, furnishes motor lubrication, three feeds being used. Inside the crankcase splash is used for the cylinder walls and all bearings. In the cooling system the most important change is a rearrangement of the pipes to and

from the cylinders, the water now leaving the pump and entering the top of the jackets between the exhaust valves and, instead of flowing into the top part of the jackets, flows through stand pipes within them, exiting from these pipes in the bottom of the jackets. The exits from the jackets are directly in the center of the tops, from which the water flows to the top of a Whitlock radiator. Low tension ignition, with current supplied by a magneto manufactured by the Locomobile company, is used. The spark is produced by a hammer-and-anvil mechanism. Final drive is by double side chains and both machines are fitted with wide side entrance bodies, the light car having a hollow dash. Hinged bonnets, with the radiator furnishing the front end, are fitted. The running brake, a broad-rimmed wheel 10 inches in diameter by $3\frac{1}{2}$ inches wide, surrounded by a double-acting metal band, is on the differential countershaft and outside the gear box. For the purpose of securing a better braking surface the metal lining in the band is riveted on in segments. The internal-expanding rear hub emergency brakes work within drums 11 inches in diameter and $1\frac{1}{2}$ inches wide. Two semi-circular cast iron pieces, pivoted on top to an arm on the radius rod hub, and connected at the lower ends by lever link mechanism, comprise the expanding shoes. These are joined by coil springs which hold them off the drums when not applied. There is a stop rod screwed into the carrier hub, which rests against the inside of the shoes so the coil springs do not draw them too far from the drum. These brakes are applied through a lever connected with the brake-expanding lever by a steel cable and compensating mechanism.

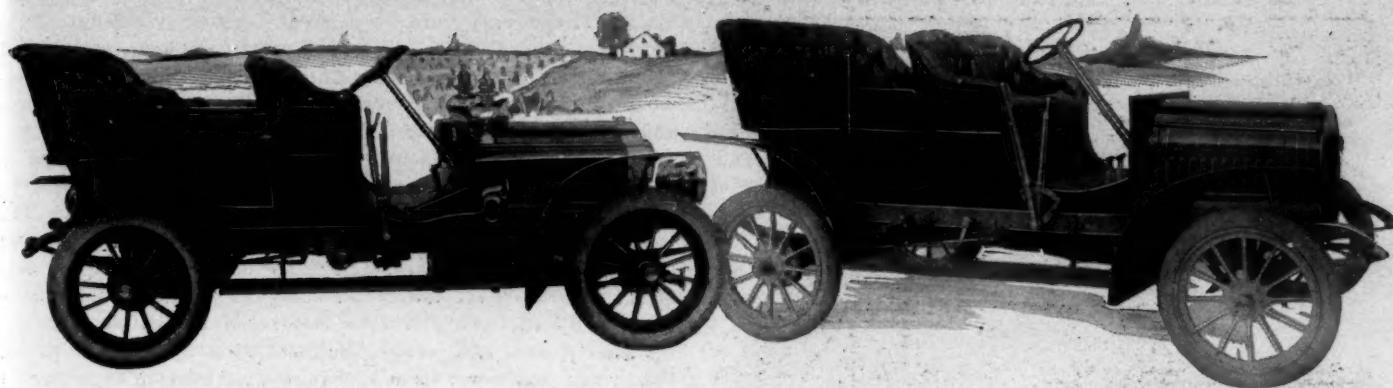
J. Stevens Arms & Tool Co.—Stevens-Duryea

To the Stevens-Duryea line has been added a limousine, placed on the regular chassis used last year. It is fitted with a 20-horsepower four-cylinder vertical motor and besides has a mul-



STEVENS-DURYEA TOURING CAR

STEVENS-DURYEA LIMOUSINE



ELMORE FOUR-CYLINDER

A TWO-CYCLE FAMILY

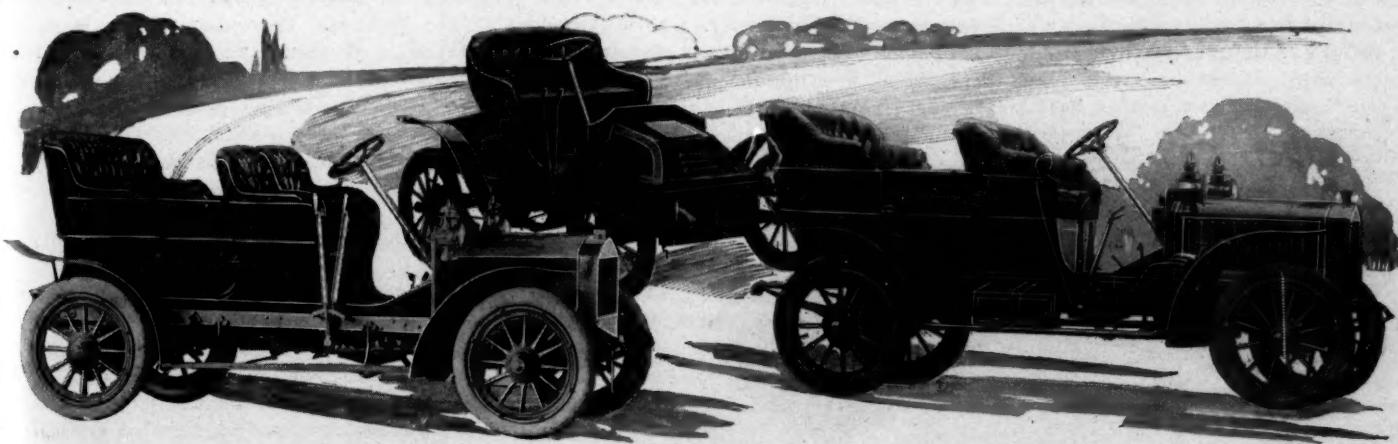
ELMORE TWO-CYLINDER

tiple disk clutch and sliding gear transmission gear set carried within one case. The whole casing has a three-point suspension, two of the supporting points being on opposite sides of the front of the crankcase and the third point at the rear of the center of the gearcase. Final drive is through the cardan shaft and there is no subframe. On the main frame the side pieces are parallel throughout their length, tied together by cross pieces. On the front end of the crankshaft, just above the front axle, is the flywheel. Carried over from 1905 is the four-cylinder touring car, which has a 20-horsepower motor, 90-inch wheel base, 30-inch wheels and 3½-inch tires, and the frame is of pressed steel, mounted in the usual way. The cylinders are cast separately, both the inlet and exhaust valves being mechanically operated and on the left side of the motor so they can be actuated from the same camshaft. Jump spark ignition is used. Pump circulation of water through a cellular radiator makes the cooling system. Sliding gear transmission, connected with the motor through a multiple disk clutch, is fitted, giving three forward speeds and reverse. A pedal transmission brake and a rear hub brake operated by a side lever are parts of the equipment. As in the new model, there is no subframe, the three-point suspension system being used. The body is of aluminum.

Elmore Mfg. Co.—Elmore

On the Pathfinder, exhibited by the Elmore people, the two-cycle motor is again exploited. This motor is constructed with vertical cylinders placed side by side beneath the center of the chassis, each with a separate gas-tight crankcase. A separate carburetor supplies the mixture and the compression of the case in turn forces the mixture into the explosion part of the cylinders. Vertical cylinders carried under a forward bonnet are used in two of this year's Elmores. The big car, a 35-horsepower five-passenger machine, has four separately cast cylinders and drives through a Mercedes type of clutch, sliding gear set and cardan shaft to the rear axle. The other new model is a two-cylinder two-cycle car, with the vertical cylinders mounted in front. As in the larger model, the power is transmitted from the motor to a clutch and from that through a planetary gear

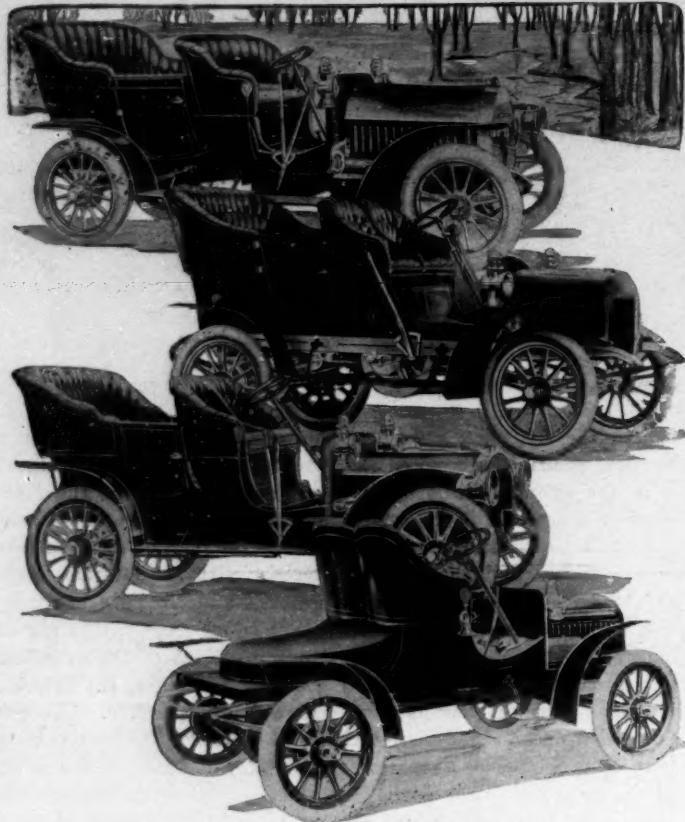
set to the live rear axle. Besides placing the cylinders in a vertical position it is noted that the head has been cast integral with the cylinder walls and waterjacket. The top of the combustion space has been arched and the spark plugs have been placed vertically in the cylinder heads. The bore of the cylinders is 4½ inches and the stroke 4 inches, with all internal parts turned and ground. The crankshaft, running in long bearings, is a hammered steel forging. There are four rings to the piston—three at the top and one at the bottom. Each of the cylinders is a separate casting and has a gastight crankcase, the interior of which is made with as small a capacity as possible. The gas is carried from the carburetor into the crankcase, the pressure here being sufficient to force it through a channel in the sides of the cylinders to the ports, from which it enters the combustion chambers. Channels on the right side of the cylinders connect the crankcase and combustion chambers, the entrance to the crankcase and exhaust ports being on the opposite side. The inlet and exhaust ports are opened by the reciprocation of the piston. There are only three moving parts in the cylinders—the revolving crankshaft, the reciprocating pistons and the connecting rods. Ports replace the camshafts, valves and push rods and other four-cycle accompaniments are eliminated. A Hill oiler, located on a separate bracket on the right side, near the dash, furnishes the lubrication. Steering is through a worm and segment gear from a hand wheel. Both axles are of tubular construction, the forward carrying on either end the steering knuckles, and being slightly dropped to protect the crankcase base. The rear axle is of the standard live type, all parts revolving on Hyatt roller bearings. A Brown-Lipe spur differential gear is fitted. Model 14, the smaller car, has a rating of 24 horsepower, with practically the same motor construction as model 15, only proportionately smaller. The wheel base is 92 inches and the car carries five people. Roller bearings are used throughout. The tonneau on this model can be detached and a turtle deck substituted. In both models the water tank and radiator are combined, the radiator being a series of flat tubes surrounded with copper fins. It is noticed that in both models



16-HORSEPOWER AUTOCAR

NEW AUTOCAR RUNABOUT

AUTOCAR

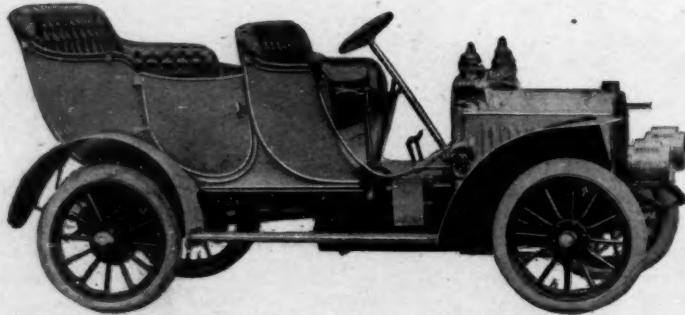


THE WAYNE LINE, MODELS F, C, K, AND H

the water tank and radiator are combined. The radiator part is a series of flat tubes surrounded with copper fins. The combined capacity of the two is sufficient for 150 miles' travel on ordinary roads. The radiator is made with a heavy framework of brass, taking the shape of the hood and having on top the usual filling cap. A simple tubing system to the pump and waterjacket is used, regular cooling being supplied.

Autocar Co.—Autocar

One model has been added to the Autocar line, making three in all—the usual runabout, light touring car and touring car which will comprise so many lines this year. The new member of the group is 24 horsepower and carries five passengers, while the four-cylinder touring car remains in its 1905 form. The runabout, though, boasts several changes, the most noticeable being the substitution of the wheel for lever steering. The wheel is on the right side with throttle and spark grip controls on opposite sides of its rim piece, similar to the style used on the four-cylinder machine last year. There is a clutch pedal, too, while the gear shifting and emergency brake levers are operated exclusively from that side. Additional power is given by increasing the bore of the cylinders, which is now 4 inches. The stroke remains at 4 inches, and the motor rating is now 12 horsepower. Instead of the present automatic type of oiler a mechanical oiler has been placed above the motor. The wheel base has been lengthened 4 inches, making it 76 inches. In general the lines of



CLEVELAND WITH VICTORIA TYPE BODY

the 24-horsepower car are the same as the four-cylinder machine. It is easily seen, however, that the body is hung higher and there is more passenger room. The bore and stroke of the cylinders are 4 and $4\frac{1}{2}$ inches respectively. Hyatt roller bearings are found in the gearbox and rear axle, while plain bearings are fitted throughout the motor. The wheel base of this model is 100 inches. In the motor there are four vertical cylinders placed in front, under the hood, the cylinders being cast separately. The inlet and exhaust valves are mechanically operated, the valve gears being encased. The bearings are bolted to the upper half of the crankcase, the lower half being removable without interfering with the bearings. The motor and transmission are on the same pressed steel cradle, protected by a metal motor shield. Splash and continuous force feed from a gear-driven oiler furnish the lubrication. The Holley carburetor is attached at the side of the crankcase. Jump spark ignition is secured through a storage battery and a four-vibrator coil. The gear-driven commutator is on the left on the crankcase. The control is by means of a right-hand wheel, with bevel gear and segment. The spark and throttle control grips are placed in the rim of the steering wheel.

Cleveland Motor Car Co.—Cleveland

What strikes one most when approaching the Cleveland stand is the graceful body of the model F 30-35-horsepower car. It is of the victoria type, with graceful lines and particularly catchy looking. But it is only the shell that encloses the meat, for this new car has many features, having been thoroughly renovated, although several of the good things of '05 have been retained. This year the Simms-Bosch low-tension magneto with make-and-break spark has been substituted for the jump spark ignition. There is considerable imported steel in the makeup and wherever possible ball bearings are fitted. Two inches have been added to the wheels and 6 inches to the wheel base. The designer has equipped the car with the Hill precision oiling system and has placed the control of spark and throttle on the wheel. One lever is used in the gear changes, and the propeller shaft has two universal joints. The torsion rod is no longer used. Going to the motor the adoption of the low-tension magneto is the most apparent change. The four cylinders are again cast in pairs, the valves being in ports on opposite sides. They are removable. Then, too, the exhaust pipes are well removed from the cylinders. The magneto is carried on a separate bracket and is gear-driven from the camshaft, delivering the current direct to the make-and-break igniters by a single wire, which collects the current from the armature and delivers it to a horizontal bus bar on top of the motor. Aluminum casings of hard bronze enclose the timing gears, the camshaft being forged in one piece and the cams integral with the shaft itself. A large centrifugal pump, mounted on the engine and driven by a gear from the exhaust camshaft, induces the circulation of water. The radiator is of the honeycomb type. A cooling fan, mounted on the front cylinder, is driven by a leather belt from a camshaft pulley. Elimination of the noise generated by high speed is aimed at in placing the fan on the front cylinder. The carburetor is of the float feed type, with compensating air openings. The throttle lever is on the steering wheel, carried on a quadrant, and is independent of the spark advance. An aluminum leather-faced cone clutch is used, and the transmission is of the sliding gear type, with three speeds forward and a reverse. The propeller shaft is equipped with universal joints and is made of high point carbon steel.

Wayne Automobile Co.—Wayne

In the Wayne family there are four members—the little runabout—model H, model C, model K and model F, the same as made last year. The leader, of course, is model F, the touring car with 50 horsepower and water-cooled. It is equipped with a four-cylinder vertical motor, with the cylinders $5\frac{1}{2}$ by 5 and cast in pairs. The transmission is of the sliding gear type, with three speeds forward and a reverse, and the ignition system includes jump spark with quad coil and storage battery. Hess-Bright ball bearings are used throughout, and the rear axle

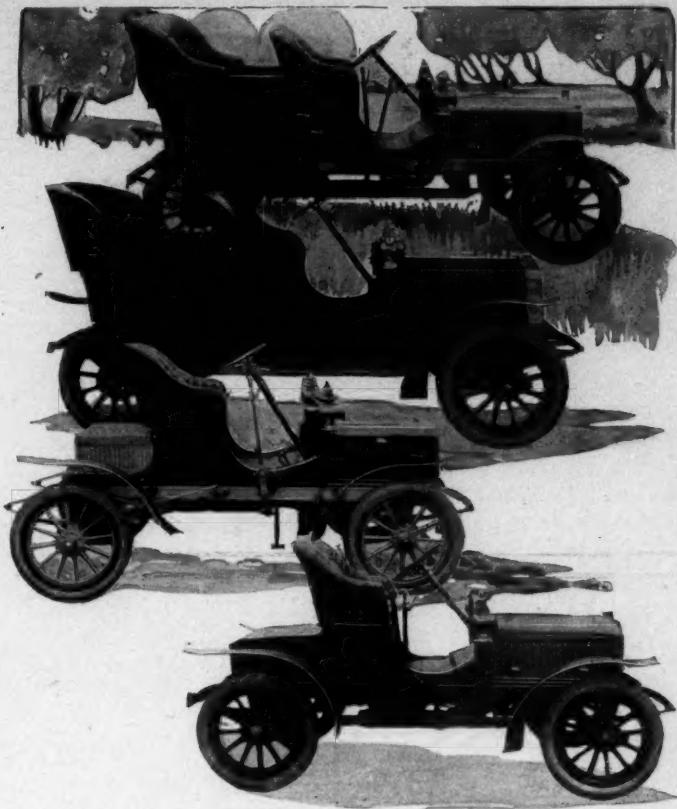
is of the shaft drive floating type and the front one made of I-beam one-piece drop forged, nickel steel. The wheel base is 114 inches and the tires 34 by 4½. The cylinders and pistons are ground. Model K somewhat resembles its big brother, only its cylinders are 4½ by 5, with the engine developing 35 horsepower. There is a difference in the tires, too, model K running 32 by 4. The motor on model C is double opposed, with the cylinders 5½ by 5 and the engine hung under the frame, developing 20 horsepower. Planetary gear, with chain drive, is fitted and the control is by a single lever which engages the high speed clutch and gives the reverse. Foot levers control the slow speed and the brake. Fourteen horsepower is developed in the runabout, the cylinders being 4½ by 4. The motor is two-cylinder opposed and is carried under the bonnet. The same control as found on C is used on the runabout. The transmission is of the planetary gear type, with shaft and bevel gear drive.

Winton Motor Carriage Co.—Winton

Departing from its usual custom, the Winton company shows several cars of one model—a large touring car known as model K, into which has been put several new ideas—notably jump spark ignition from storage battery, a Hill mechanical oiler, new style of carburetor, and new front and rear axle design, while the cylinder parts are ground. The Winton lines are followed in general and such well known features as individual clutch transmission, air control of inlet valves, twin springs and vertical motor with cylinders cast in pairs are retained. In the ignition system a magneto is included for those who desire it, but the storage battery scheme is favored. The spark plugs are vertically mounted in the center of the cylinder heads and the current comes from a 6-volt battery and one set of dry cells carried in a lock box on the running board. The commutator, which is gear driven, has a roller contact point working against hardened steel contacts. A four-vibrator spark coil is used and the spark control lever is on the steering wheel. The Hill mechanical oiler which furnishes motor lubrication is an eight-feed affair reaching all motor bearings. The oil, after being used in the bearings, enters holes in the crankshaft, and is conducted by centrifugal action to the crank pin bearings. The splash fills the oil grooves in the pistons which lubricate the cylinder walls. Air pressure is used to force the oil from the large oil tank to the oiler. The carburetor is of the Holley design and is of the compensating type, with the float concentric with the spraying nozzle. It is automatic. The spark and air-controlled inlet valves are the only motor regulators, the carburetor not being adjusted in controlling motor speed. As a reason for grinding the cylinder walls, the surfaces of the pistons, the piston rings and the valves, the company claims better compression and easier movement. The arched-top piston, with three compression rings on its upper end and oil grooves in the lower parts, is retained. The connecting rods are not split at the wrist pin ends, but fasten to the crank pins by means of an angular split, the same as last year. Push rods are eliminated through the use of exhaust valves having long stems which at their bottoms screw into short seats that carry rollers against which the cams bear. The front axle is new and is made from I-section manganese bronze, dropping from where the steering knuckles are carried to the center for crank case clearance. The springs rest on integral seats on the axle. The drive shafts in the rear axle extend from the hub caps to the spur gears in the differential, the shafts being so designed that when the caps are removed they can be withdrawn and the differential disassembled, the axle casing supporting the car.

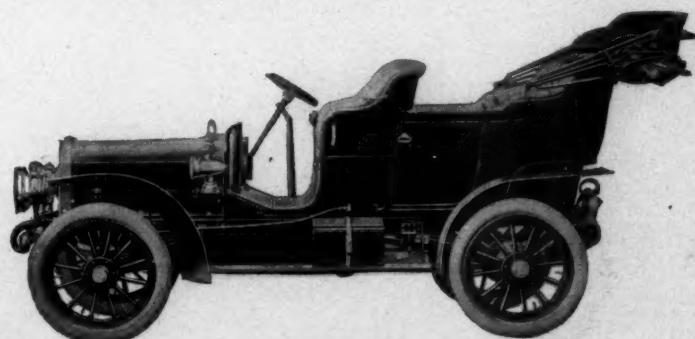
Mitchell Motor Car Co.—Mitchell

In the four models shown by the Mitchell people several classes are catered to—those who cannot make use of a five-passenger car and yet want the same speed and power, and those who already own a big machine and would like a smaller one of the same power for convenience in getting around. Both these classes are expected to take a shine to the runabouts. For those who want something finer the other two models are built. Model



THE MITCHELL MODELS D4, B4, B2, C4

C-4, runabout, has a four-cylinder vertical motor, 3½ by 4 inches, with 14-18 horsepower. It is equipped with sliding gear transmission, three forward and a reverse speed, and drives direct on the high speed with no gears to mesh. Shaft drive is used and the lubrication is mechanical. A float feed carburetor is fitted. A cellular radiator has a fan to assist in the cooling, while the steering gear is irreversible. The control is by spark and throttle and the car is fitted with foot and hand emergency brakes. The wheel base is 86 inches, the tread 56 inches and 30-inch artillery wheels are used, the tires being 3½ inches. The springs are 38-inch half-elliptic front and rear and a speed of 40 miles an hour is promised. In general model D-4 is like model C-4, only that the engine is larger and the body gives greater comfort. Considerable care has been taken on the upholstering and finish and the Mitchell people believe they have a car that will suit the demands of the buyer for something finer and more luxurious than the runabout. The bore and stroke of the engine are 4½ and 5 inches and 24-30 horsepower is furnished. The wheel base is 100 inches and the tread 56 inches. Four-inch tires are fitted and the springs are 40-inch half-elliptic. Otherwise the mechanical features are the same as are found in model C-4. The second barrel to the Mitchell runabout shotgun is model B-2, which has a two-cylinder vertical engine mounted in front, sliding gear transmission, mechanical oiler, irreversible steering gear and a pressed steel frame. The wheel base is 76 inches and there is a 54-inch tread. The control is by spark and throttle.



WINTON MODEL K



IROQUOIS FOR 1906

and the lubrication mechanical. On this car 9-10 horsepower is furnished. Model B-4 is the four-cylinder side entrance tonneau car of 16-20 horsepower. The wheel base is 90 inches and the tread 56 inches. Shaft drive is employed. Other details are similar to those found in the other models.

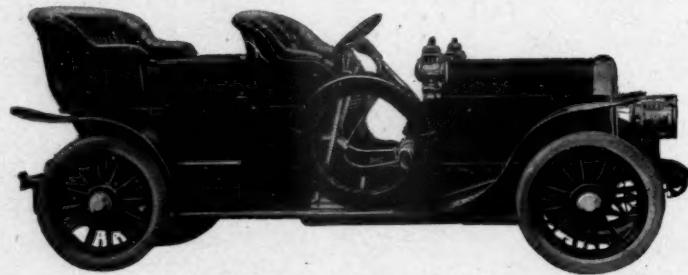
Iroquois Motor Car Co.—Iroquois

What distinguishes the Iroquois from many of the other cars on exhibition is the rear entrance to the tonneau which is retained by its designer. Model D carries five persons and weighs 2,400 pounds. It has a wheel base of 100 inches, 56-inch tread 32 by 4-inch tires, worm and sector steering, 25-30 horsepower and a four-cylinder motor, the cylinders being cast in pairs and set in front under the hood. The valves are mechanically operated. A jump spark system is used with two sets of batteries, while the carburetor is throttled by hand-control and governor. The expansion clutch is operated by a foot lever, while the sliding gear transmission gives three speeds forward and a reverse, with direct shaft drive on the high speed. The connection with the clutch is by a universal joint. With the rear axle it is through a shaft with two universal joints and a bevel gear. The live rear axle is fitted with Timken roller bearings. The frame is of 3½-inch deep rolled steel, reinforced with angle iron mounted on four elliptic springs, the two rear ones being of the scroll end type. There are four separately cast water-cooled cylinders in the motor, with a 3½-inch bore and 3¾-inch stroke. The casting part of each cylinder is an integral piece, each cylinder being separately bolted to the top half of the crankcase, which is made with the five crankshaft bearings in the top part, so that the bottom part can be easily removed without interfering with any of the other parts. The cylinders and rings are turned and ground, and the connecting rods are drop forgings, adjustable at both ends. The bearings are bronze bushings, filled with babbitt metal, similar bearings being fitted to the crankshaft, which is a steel drop forging ground to size. Valve ports are on the right side, the inlets and exhausts being in the bottom of the ports. One camshaft carried in the crankcase and driven by front-end gears operates the valves, which are interchangeable and have integral stems and heads. Compression reliefs are over the exhaust valves, and the spark plugs are placed upright in the tops of the ports over the inlet valves. The commutator is on top of a vertical shaft in front of the flywheel, the shaft being bevel-driven from the camshaft. The current comes from either storage

battery or dry cells. Rutenber lines are followed throughout in the engine. The sliding gear transmission is contained in an aluminum case and carried on subframe pieces directly in the rear of the motor and gives three speeds ahead.

Moline Automobile Co.—Moline

On the stand of the Moline people are found three models. Model A is in every way a duplicate of model C except as to size, being larger in all details. Model G has a detachable tonneau and its lines are not quite so attractive, the sides of the seat being straight instead of curved. On this model is used a Hill precision force feed oiler. Model A is the 30-35-horsepower touring car, with a four-cylinder motor 4½ by 5-inch. The cylinders are cast in pairs with the head, waterjacket and valve chambers integral. The cylinder bore, pistons and rings are ground to size, in this way being interchangeable. Of the four eccentric rings each piston has one of them, the lower one, placed directly over the ends of the piston pin, preventing the pin from loosening and scratching up the cylinder walls. No subframe is used, the aluminum crankcase being cast in two pieces, with supporting arms at the four corners and resting on the sides of the main frame. The three crankshaft bearings are carried in the upper half of the case so that the lower half may be removed without disturbing the motor. To prevent the oil from running to the ends of the case when going up hill the bottom half has a dividing partition. Gear noise is eliminated by the water pump and fan and the camshaft being operated by gears that are so arranged that rawhide or fiber gears mesh with metal. Nickel babbitt is used for bushings on the crankshaft and crankpin bearings. Sliding gear transmission giving three speeds forward

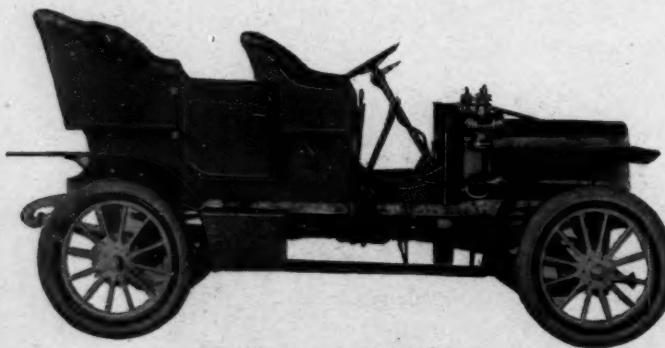


STEARNS 40-45 HORSEPOWER

and one reverse is used, the drive on the high gear being direct. There is jump spark ignition, with a quadruple coil on the dash and a ball bearing timer on a vertical shaft. A leather-faced cone clutch is used. The rear axle is of seamless steel tubing, with the driving shaft carried on flexible roller bearings. A Brown-Lipe differential is used. The front axle is of the same metal, the steering knuckles being brazed and pinned securely at the ends. The wheel base is 110 inches. There are two pairs of hub brakes. The gear-shifting lever and emergency brake lever are outside of the body at the right of the driver. The cooling is accomplished by means of a gear-driven centrifugal pump, assisted by a gear-driven aluminum fan. The light touring car has a motor with 3¾-inch bore and 4½-inch stroke and develops 18-20 horsepower. The wheel base is 100 inches and the car is equipped with Brown-Lipe steering gear. The motor on the 16-horsepower runabout is double-cylinder, horizontal opposed under the body, with 4¾-inch bore and 5-inch stroke. The transmission is of the planetary type, all spur gears. Chain drive is used and the wheel base is 86 inches.

F. B. Stearns Co.—Stearns

One model—a 40-45-horsepower machine—is on exhibition, a car in the construction of which a large amount of imported material is used. Five-inch section pressed steel, ½-inch thick, is used in the frame, which is 13 feet long and carried on six-leaf, 50-inch rear springs and 40-inch front ones. The wheel base is 118 inches. Valves in the four cylinders, which are cast in pairs, are of large diameter and placed in pockets brought out to give sufficient space. Lapping the cylinders and

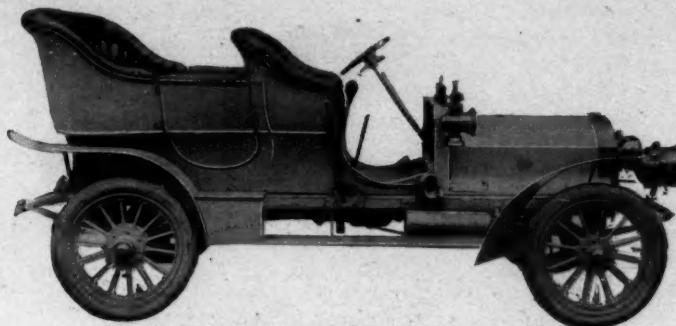


ONE OF THE MOLINE MODELS

pistons with crocus after they have been ground gives piston fit. In the ignition system a positively driven high-tension magneto, operated through a gear from the camshaft, is used. Where specified a high-tension coil is furnished. A two-part float feed type of carburetor is fitted, a lever on the steering wheel operating a throttle on the intake, at the same time opening a butterfly air valve at the side of the air chamber. Assisting in the cooling is a big belt-driven fan, with an auxiliary fan formed by the spokes of the flywheel. The transmission is in an aluminum case, well back in the frame, but accessible from the floor of the tonneau. The gears run in oil. The transmission is of the selective type and there are four speeds forward and a reverse, with the drive direct on the high speed. All bearings for the transmission axles and shafts are mounted on Hess-Bright ball bearings. A large bearing of this type takes up end thrust on the shaft. Heavy roller chains at the sides transmit the power to the road wheels. Two internal expanding brakes on the rear wheels and an emergency brake are fitted. The body is of French design and of cast aluminum, with a total seating capacity for seven. The rear wheels have 36 by 4½-inch tires and the front 36 by 4-inch. The internal expanding brakes on the rear wheels are connected to a side lever, while the differential brake is operated by a foot lever.

Dayton Motor Car Co.—Stoddard-Dayton

Besides a four-cylinder runabout, which has for features cylinders with 3¾-inch bore and stroke, three speeds and reverse selective type of sliding gear, and final shaft drive, there is the five-passenger Stoddard-Dayton touring car upon which many new things have been introduced. The power has been in-



STODDARD-DAYTON 30-35 HORSEPOWER

to the rear seat. A four-vibrator coil is mounted on the dash, which is one-piece instead of three. The standard pearl gray color is retained. A limousine is also part of the exhibit.

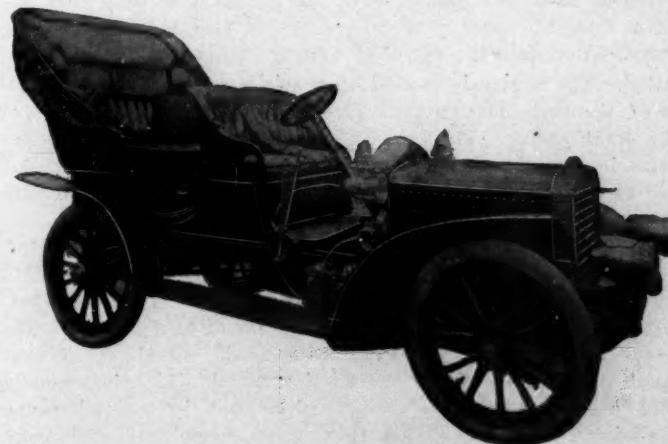
Royal Motor Car Co.—Royal

Instead of making two models for this year's market, the runabout has been dropped and a touring car alone put on the market. In looking over this model one does not discover many changes, the alterations over last year's models being confined largely to a few minor details chief among them being the lengthening of the wheel base from 108 to 110 inches, the suspending of the gear case by the top half instead of the lower half, the use of worm and segment-steering gearing as a substitute for the rack and pinion type, and the use of Hess-Bright ball bearings in the transmission gearbox. The round topped radiator and dash, roller bearings in the road wheels, floating type of rear axle and cone clutch and subframe for carrying the motor and gear box are the same as used in the 1905 model. The motor is rated at 32-38 horsepower and has four vertical cylinders cast in pairs, with mechanical interchangeable valves placed in opposite ports made by offsetting the top of the cylinder castings. The inlets are in the bottom of the ports on the right side, and like the exhausts are removed by unscrewing bronze caps from the ports directly above, through which the valves can be extracted. It is particularly noticeable on the motor that the camshafts are housed in separate chambers, with the top part of these compartments readily removable so that the camshafts can be taken out without interfering with any other parts of the crankcase. In removing the top part of the cam-shaft only eight nuts are taken off. There are four bearings to each shaft and the cams are pinned in position. The crankshaft is a forging, with three ground bearings, each fitted with special oil rings for conducting oil to the crankpin bearings. The pistons are made with compression rings carried above the hardened and ground wrist pins and on the lower ends are oil grooves. The spark plugs are placed vertically above the inlet valves in the ignition system and the commutator is carried on the top of a flexible shaft between the pairs of cylinders. A float feed carburetor is carried low on the right side of the motor with V piping conducting the mixture, one arm going to each cylinder.

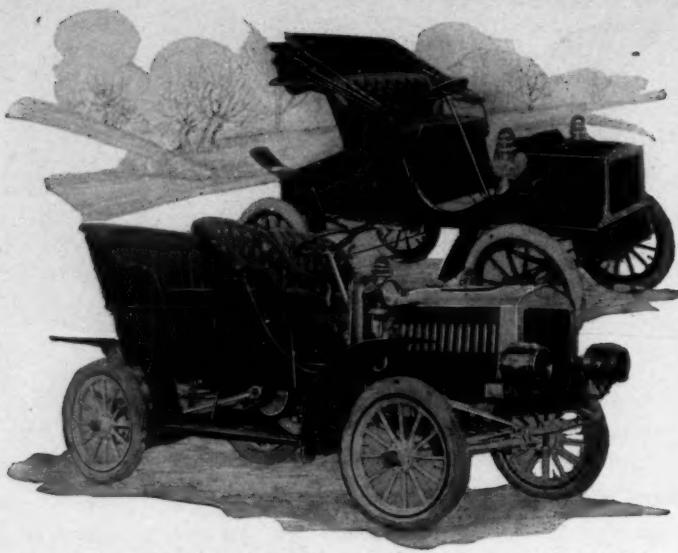


LATEST ROYAL PRODUCTION

creased from 25 to 30-35, and instead of 4 by 4-inch cylinders there are 4½ by 5-inch ones, and the common type of sliding gear has been replaced by one of the selective type, which gives the same number of speeds but with changes effected through a side lever instead of from the steering column. In the road wheels, transmission set, propeller shaft and rear axle Timken roller bearings are used. The rear axle is of the floating type and the wheel base has been lengthened from 96 to 103 inches. The maker has stuck to the 32-inch wheels, but has increased the tire diameter to 4 inches. The weight of this model now approximates 2,100 pounds. A critic looking the car over notices that the chief changes come in the transmission of power from the motor. The clutch is of the external cone type, with the flywheel carried on an integral flange on the crankshaft and not much changed. The crankshaft with a continuation form a bearing for the male portion of the clutch. This part is bolted to the clutch hub and bears directly on the crankshaft continuation, serving only as a bearing, and to a hollow portion through which it is connected to the driveshaft in the gear box. The propeller shaft to the rear axle is housed within a casing acting as a torsion rod between the gear box and the axle and for removing the strain off the shaft when running. The new radiator is made of twenty vertical flat tubes connecting between upper and lower water tanks instead of the one of horizontal tubes used last year. A double set of zig-zag flanges separate the tubes. Outside of being larger not much change can be noticed in the body. The gasoline tank is placed beneath the front seat and a tool box is made within the step



THE 1906 ARDSLEY CAR



GALE TOURIST AND GALE RUNABOUT

casting. In the gear box one innovation is the suspending of the case from the top half, there being four integral arms for this purpose, each resting on the subframe pieces. Transmission from the gear case is by universal-jointed propeller shaft to the bevel differential in the center of the rear axle. The differential housing is made in two parts. The road wheels run on roller bearings and are fitted with 34 by 4½-inch tires.

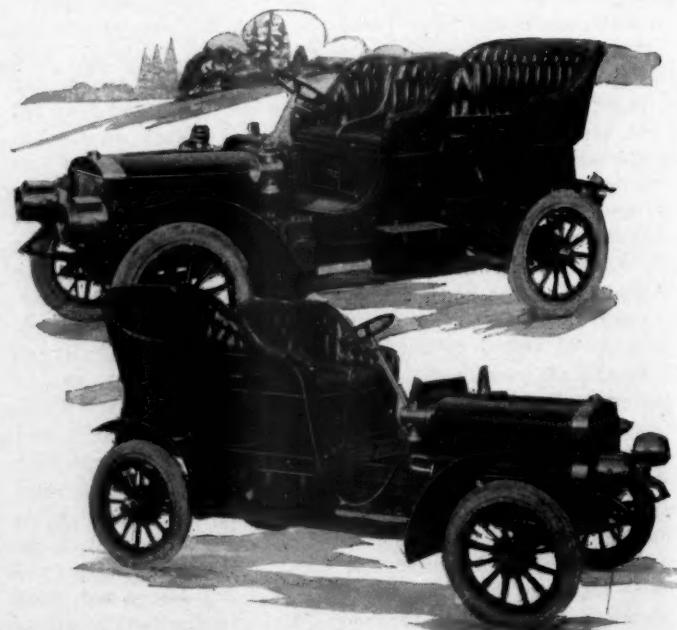
Ardsley Motor Car Co.—Ardsley

One of the strong features of the 1906 side entrance Ardsley touring car is the carburetor, the design of the company's engineer. It is of the float feed spraying type, with the main body made of aluminum and the float chamber and valve housing of cast brass. There is only one joint on the float, which is made of spun brass. A cap forms the top part of the float. Controlled by a needle valve actuated by the float through a pair of balance levers, the gasoline admission to the carburetor is at the bottom of the float chamber. The spraying nozzle, provided with a needle valve for adjusting the spray opening, extends into the main air passage, which is of double conical form. This increases the velocity of the air at this point and with it the suction. There is an auxiliary air inlet controlled by the throttle valve in addition to the main inlet. The throttle valve is of the sliding, hollow drum type, completely balanced. Oval-shaped holes cut in the wall of the throttle housing are adapted to register as the throttle is opened. An integral jacket surrounds the body of the carburetor so that a portion of the exhaust gases is shunted through this jacket, which allows only the use of cold air in the carburetor. As cold air has a greater density an advantage is claimed in that a greater charge is taken into the cylinders. A finger lever on a stationary sector on the steering wheel operates the throttle. The engine is a four-cylinder 4½ by 5¾ affair rated at 35-40 horsepower, with the cylinders cast in pairs and with integral water jackets and valve chambers on opposite sides. Mechanically operated and interchangeable valves are fitted. The engine is carried on a subframe and the crankshaft is of the three-bearing type suspended from the upper half of the crank casing. The exhaust camshaft is made with auxiliary cams besides the regular ones, which serve to hold the exhaust valves open during a part of the compression stroke. In starting the motor this shaft is moved lengthwise, bringing the auxiliary cams to meet the push rods, thereby permitting of easy starting. Carried on one of the running boards is a 6-volt Witherbee storage battery, ignition being by jump spark. A Lacoste quadruple vibrator and a Lacoste roller commutator are fitted. The pressure feed method of lubrication is used. An aluminum cone faced with leather forms the friction clutch which is normally held in engagement by a spring and released by a clutch pedal. A sliding pinion type change speed gear is employed, with three forward and one reverse and direct high speed drive, the gears

being operated by a single side lever. Drive to the rear axle is by a propeller shaft with a universal joint at the front and a slip joint at the rear. The car weighs 2,250 pounds.

Knox Automobile Co.—Knox

In the air-cooling line the Knox people not only show the four styles of model F with two-cylinder opposed motors, but are also out with model G, in three styles, in which four cylinders placed vertically in front and with the power transmitted through a metal-to-metal cone clutch running in oil, a Mercedes type of sliding gear and double chains are the predominating features. On the new model each cylinder is a separate casting, with the head integral. Valve ports are not required because the mechanical inlet and exhaust valves have been placed side by side in the heads. The four cylinders are carried on a two-part aluminum crankcase. The porcupine scheme of cooling has been retained and the cylinder bore and stroke are 4½ and 5½ inches. The valve actuation is by a separate overhead rocker arm for each valve, allowing any one to be easily removed. The inlet and exhaust valves are interchangeable. The five crankshaft bearings are carried in the upper half of the crankcase, a split aluminum chamber. The crankshaft is made from nickel steel. Bronze bearings are used throughout. In the ignition the ordinary spark plugs are carried horizontally in the right side of the cylinders below the inlet valves, the current being secured from a high tension gear-driven magneto on the right side of the crankcase. A Holly carburetor is fitted. Something new is shown in the metal-to-metal cone clutch, an oil-tight chamber enclosing the cone surfaces. When the clutch is not engaged the male and female parts are covered with an oil film. To positively connect the two parts this film must be expelled and as it takes time to do this the usual jump of the car when the clutch is thrown in is avoided. There is no universal joint between the clutch and the gear-box. Patterned along Mercedes lines, the gear-box gives four forward speeds and a reverse, all obtained on the selective system through three sliding units within the case and through a single lever working in a gate quadrant. Non-adjustable Hess-Bright ball bearings are used on all the shafts. The tonneau type of model G carries seven people and the horsepower is 35-40. There is room for six in the limousine, with the same horsepower. The car weighs 3,200 pounds and the wheel base is 112 inches. The model F1 is a runabout with a folding front seat, with 14-16 horsepower 5 by 6-inch cylinders planetary transmission, two cylinders and weighs 1,850 pounds. Model F2 tonneau seats five and weighs 2,000 pounds. Model F3 is a surrey carrying two or four, there being a steel front seat. The approximate weight is 1,950 pounds.



MODELS D AND C PULLMAN

Model F4 is a two-passenger tourist machine weighing 1,600 pounds and having the same general specifications as the other three in this group.

York Motor Car Co.—York

Formerly the York Automobile Co., this concern comes to New York with four of its pullman touring cars. The company, however, only turns out three models, two of them touring cars and the third a high-powered four-cylinder runabout. There is no line marking the seasons, the models first put out several months ago being so satisfactory that no changes were arranged for 1906. Model D, the big touring car, has a tonneau built of solid bent wood and a seating capacity for five persons. The motor is 30-35 horsepower, four-cylindered, with the cylinders arranged vertically. The ignition is jump spark and the drive shaft and bevel gear, with an expanding clutch with double face bronze ring. The transmission is sliding, three speeds forward and a reverse, all gears being idle on the high speed. The wheel base is 102

front at an angle of 45 degrees, exposing the entire power plant. The fuel tank and battery box are carried beneath a large false hood in front, the bonnet being formed by the horizontal tube radiator. Angle steel pieces have been used in the sides and ends of the main frame, two cross channel parts midway of the ends carrying the motor. The box-like crankcase has the ends bored for carrying phosphor bronze crankshaft bearings. Valves are interchangeable and mechanically operated. The float feed carburetor, beneath the footboard at the left, connects through a Y system of piping, the mixture to each pair of cylinders traveling the same distance. Regular push rods lying along the under side of the cylinders actuate the valves, which are made with integral heads and stems. Large curved integral feet are used, instead of rollers, on the ends of the push rods. Three compression rings, each with lap joints, are carried on the pistons. The crankshaft is a drop forging. A chain-driven Hill oiler furnishes the lubrication. A double dash-pattern coil with current supplied from two sets of dry cells furnishes the ignition.

TWO-CYLINDER SURREY

THE KNOX GROUP

FOLDING FRONT SEAT RUNABOUT



FOUR-CYLINDER LIMOUSINE

TWO-CYLINDER TOURING CAR

TWO-PASSENGER RUNABOUT

inches and the tread 56 inches. On the model C touring car the wheel base is only 96 inches and the motor 24-28 horsepower. Otherwise it is about the same as D. The runabout has a four-cylinder motor developing 24-28 horsepower. With the exception of the power the motor used in all three models is the same. The 24-28 has cylinders with $4\frac{1}{2}$ -inch bore and 4-inch stroke. Although the cylinders are cast separately, they are of peculiar construction, the core forming the waterway cutting through the outside shell at both sides. There is a flanged joint all around the opening, the joints being machined and all the cylinders bolted together, in this way forming a complete waterway from end to end of the motor. For this method of making cylinders is claimed the advantage of insuring an equal thickness of metal. When the four cylinders are bolted together they form a girder or stiffening truss, avoiding any possible strain coming on the aluminum case which supports the cylinders. Through the use of this construction any one cylinder can be removed without disturbing the others.

Western Tool Works—Gale

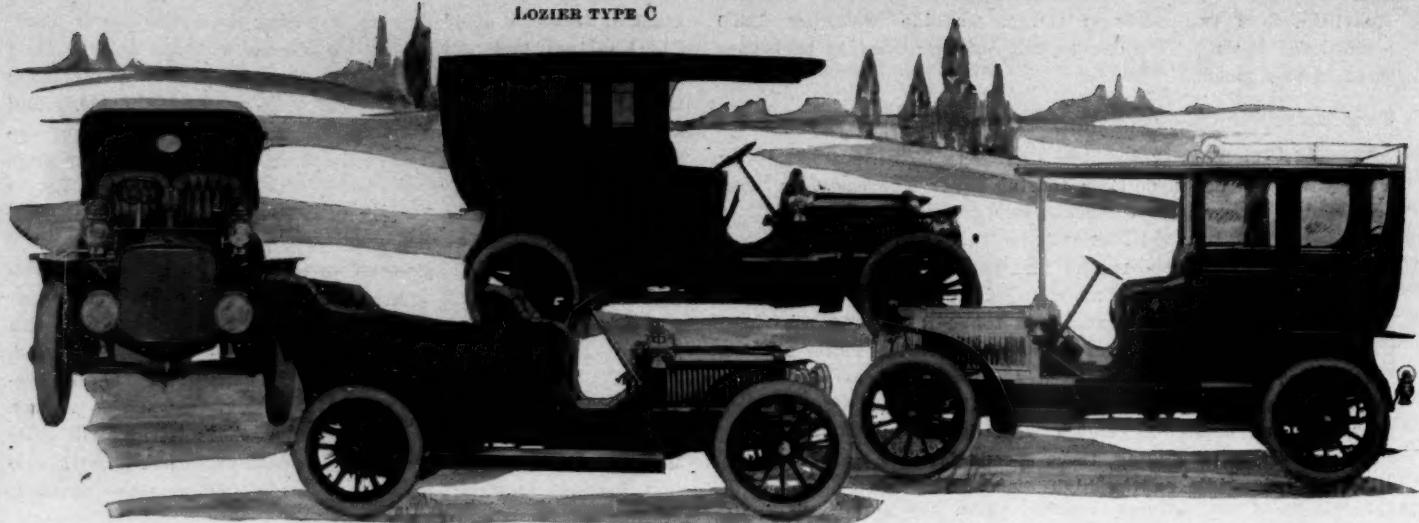
Here two models are shown, a light runabout the company has had on the market for a year, and the Gale two-cylinder 18-horsepower touring car. In this latter the motor is carried lengthwise beneath the body, the drive being through a two-speed and reverse planetary gear set and single chain. There is every evidence that the designer has attempted nothing radical, aiming rather to secure accessibility, the body being hinged at the rear and divided behind the footboard so it can be raised in

Both cylinders are cooled from the same system, the water circulation being maintained by means of a single pump on the end of the crankshaft. The gear set is carried on the right end of the crankshaft, which has a third bearing in the right side of the frame. The chain sprocket is placed at the outside of the gearcase. As the differential is placed at the right end of the divided axle the clearance of the machine is increased and the driving strain on the crankshaft and axle is placed close to the end bearings instead of in the center. All gears within the set are made with coarse pitch and the set is designed on the three-pinion principle. Hyatt roller bearings are fitted to the rear axle, $\frac{1}{2}$ -inch ball end thrusts being used to remove any possible friction at this point of construction.

Lozier Motor Co.—Lozier

One of the largest stock cars on the market is the Lozier, with its 117-inch wheel base, 55-inch tread and 36-inch wheels fitted with $4\frac{1}{2}$ -inch tires. The car is also equipped with platform spring suspension and has a road clearance of 10 inches. The front and rear axles are I-beam section forged without weld from nickel steel, with steering knuckles of forged nickel steel and fitted with ball bearings. The wheels also have ball bearings and the inside rear wheel bearings are directly under the driving chains. For the purpose of keeping the motor and transmission free from dust and dirt a cast aluminum case is placed under the motor, flywheel and entire transmission. There is a slight difference in the bore and stroke of the four-cylinder vertical motors on the two models, the 35-horsepower model C having $4\frac{1}{2}$ and $5\frac{1}{2}$ -inch and the

LOZIER TYPE C



LOZIER COUPE

LOZIER TYPE D

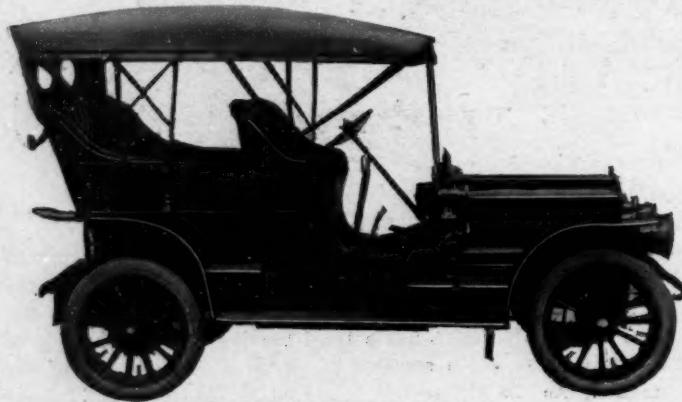
LOZIER LIMOUSINE

40-horsepower model D 4½ and 5½-inch. The cylinders are cast in pairs and bolted to an aluminum crankcase. Each piston carries four rings. Cottered bolts hold the wrist pins in position and the reciprocating and rotating parts are balanced. The valves and stems are of nickel steel, the inlet and exhaust being mechanically actuated and on opposite sides of the motor. The crankshaft journals are all ground and hardened and the crankshaft itself is machined from a solid slab of 30-point carbon steel, with the arms webbed instead of being re-forged into shape. Cams and gear flanges are integral and the camshafts are machined from a single forging of tool steel. There is a camshaft on each side of the motor, each of them direct-driven by a steel pinion meshing in with large combination fiber and bronze gears. Lubrication is had

and hold in both directions. A dog and ratchet back stop on the differential brake drum enables the driver to start the car on steep grades with all brakes free, it being worked by means of a small hand lever on the emergency brake quadrant. Double side chain drive is used, the rear wheel sprockets being made in one piece, with the brake drums bolted against the rear wheel spokes. The forward sprockets are carried outside the frame on the differential shaft. Cam action automatically disengages the starting crank.

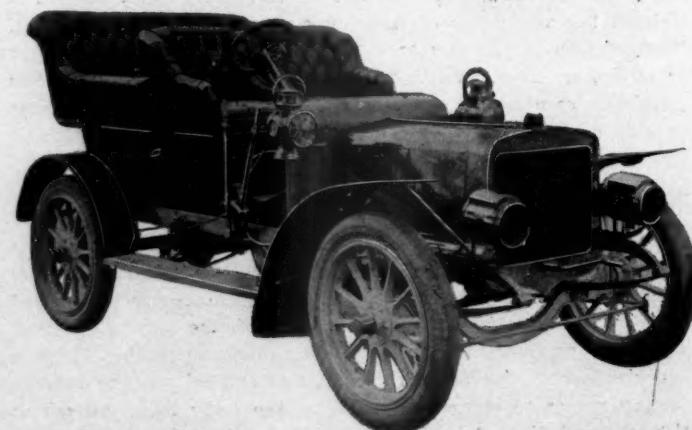
Oscar Lear Auto Co.—Frayer-Miller

Chief interest in the Lear exhibit is centered in the six-cylinder motor on the air-cooled touring car shown by this company. In addition it has a four-cylinder touring car. Statistically speaking, the six-cylinder model has a wheel base of 109 inches, a 56-inch tread, 34 by 4-inch tires, 4 1-16 and 5 ½-inch bore and stroke, side entrance tonneau body, doors swinging to the rear, seats for five passengers, 50-inch rear seat cushion and weighs 2,250 pounds. The six-cylinder motor has the same individual cylinder design as the four. Each cylinder casting is an integral piece with a bottom portion without radiating members, the top half surrounded by thirty-two rows of cooling spines, thirteen in a row, and the head, which is slightly ovoid, carries a ring-like portion on the top, the exhaust valve cage entering the ring opening at one side and the inlet cage placed oppositely. Circular flanges are provided on the ring-like portion. Valve cages are made with a stub pipe for connection with the muffler or carburetor and have a pair of arms mounted at 45 degrees for carrying the bell crank which actuates the valves. A single screw retains each cage in position. Last year's method of enclosing the top portion of each cylinder in an aluminum housing which connects with an overhead pipe to the rotary blower carried in front is retained. A novelty is noted in that the interior of the piston head is made with short spines for assisting in cooling it. In the float feed car-



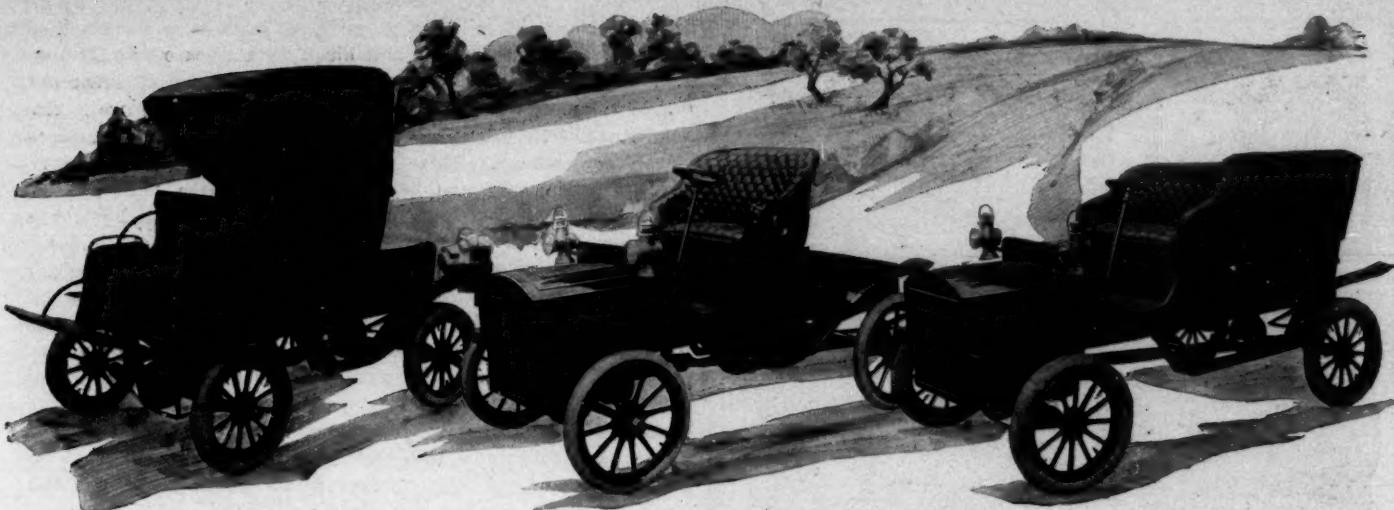
FRAYER-MILLER TOURING CAR

through a combined splash and individual force-feed oiler for the motor, with grease cups or spring oilers for the chassis. There are five feeds, each operated by an independent piston pump driven from the camshaft. Current for the jump spark ignition comes from two accumulators of 80-ampere hours each, connected to a high tension spark coil, a two-point switch connecting them. The carburetor is of the float feed type, the speed being automatically regulated through a balanced throttle valve and engine governor of the ball type. The steering gear, enclosed in bronze gear box, is of the worm and sector type. The tie rod is located back of the front axle. A leather-faced cone type clutch with a self-contained thrust is used. There are springs under the leather which furnish easy engagement and the cone can be taken off by swinging aside the flexible intermediate clutch shaft and unbolting the driving disk. There is an unusual width to the clutch surface—3 inches—held in contact by means of a helical spring. Power is transmitted from clutch to gear box through a nickel steel clutch shaft. Sliding gear transmission is employed, model C having three speeds and reverse and model D four speeds and reverse. Annular bearings are used on the gear bearing, axles, differentials and differential shaft. The brakes are of the metal-to-metal type



A NEW ST. LOUIS CAR

THE DORRIS



TWYFORD STANHOPE

TWYFORD RUNABOUT

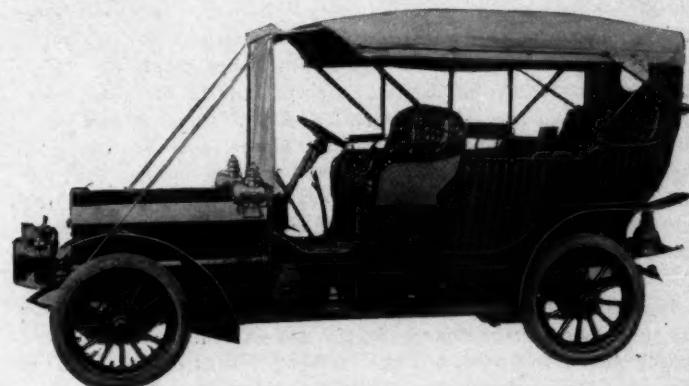
TWYFORD TOURING CAR

bureter the gasoline, when the car is not running, is just below the top of the vertical gasoline nozzle, which is the middle of the carbureting throat. Four movable wings, working automatically by the varying speed of the air, control the air passage. The air pressure is controlled by a vertical sleeve air valve, the air being taken from the air chute to the under side of a piston connected with the vertical sleeve air valve. The bell crank from the throttle control is placed between two coiled springs on the governor piston rod, which enables the driver to control the admission of air to the carburetor. When the driver releases the hand control the air piston at once resumes the automatic fuel regulation. Hess-Bright bearings are used in the change gear set, which is of a selective type, with four speeds forward and a reverse. All gears are hardened. An aluminum, leather-faced cone clutch is fitted. In general the four-cylinder car resembles the new model, blowers, cylinder-cooling cylinders and valves being identical. Where the six-cylinder has a 109-inch wheel base the four-cylinder has 100. Four-inch tires are fitted to the 34-inch wheels of the four-cylinder. Axles, speed change, control and bevel gear are also the same.

Fairmount Engineering Works—Chadwick

For the 1906 trade a 45-50-horsepower Chadwick is offered by its Philadelphia maker, the car being shown in all its glory on a well decorated stand. The attendants have plenty of talking points in stock, chief among them being copper waterjackets for each pair of cylinders, a water governor for the carburetor throttle, compensating ball bearings in the road wheels and end bearings of the jackshaft, and four speed ahead sliding gear transmission, with a double set of bevels driving to the differential on the jackshaft in the rear of the gear box. There is also an automatic carburetor. All these things are new, the car also having such old features as double chain drive, cone clutch and tubular suspension of the gearbox. The motor is of the vertical four-cylinder type, the cylinders being cast in pairs, each water-jacketed by a single copper jacket. The carburetor follows modern tendencies and has a ring float within the chamber and a spraying nozzle in the center of the float, so the level of the

gasoline in the nozzle is the same at all times as its level in the float chamber. There is an automatic shutter at the bottom of the mixing chamber which works in connection with the throttle so that when the latter is turned, thereby cutting off part of the supply to the cylinders, this shutter is moved. It is also apparent that in the ball bearings in the road wheels and the ends of the jackshaft there is one peculiarity—the cones are so designed as to accomplish a compensating action so that when the balls are slightly worn in one race the cones automatically adjust themselves. The water governor works on the principle that pressure in the water system is in direct proportion to the speed of the motor. It acts directly on the carburetor throttle. The cone clutch is 17 inches in diameter, with an

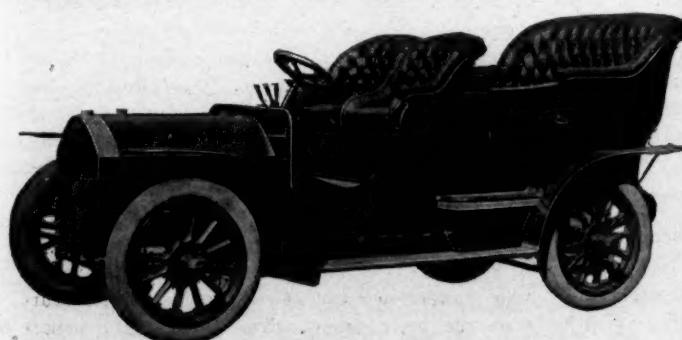


APPERSON CAR WITH KIMBALL BODY

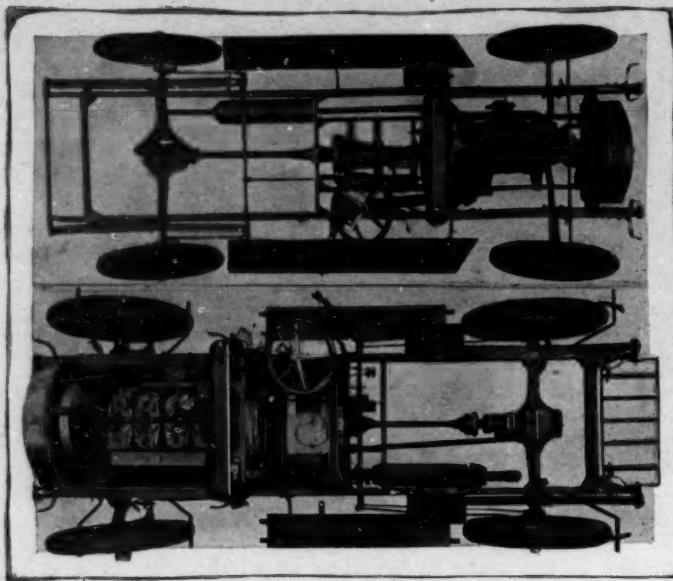
aluminum cone fitted. The clutch can rock in any direction without straining the arms because the female portion, also aluminum, is fastened to a rocking center made from hardened steel. Only one lever is required to change speeds. The gear box is mounted on steel cross tubes, leaving the case free to float with the frame.

Apperson Brothers Automobile Co.—Apperson.

A 40-45-horsepower touring car, a 50-55-horsepower detachable limousine, and a finished chassis comprise the exhibit of this Hoosier concern. In all of these the same design of motor is used, which differs in a great many details from that used in the past by this concern. First of all, it is made by the company at its own plant. The four cylinders are separate castings, with valves disposed in the bottom of ports on opposite sides of the cylinders and removable through openings in the top of the ports, screw caps serving to cover the openings. Cylinder measurements in the large car are $5\frac{1}{2}$ and $5\frac{1}{2}$ inches, and in the other these are reduced to 5 and 5 inches. Among the many features to be noted in connection with the motor is the use of large brass plates serving as heads to the water jackets and having the water pipes to and from the radiator enter the jacket

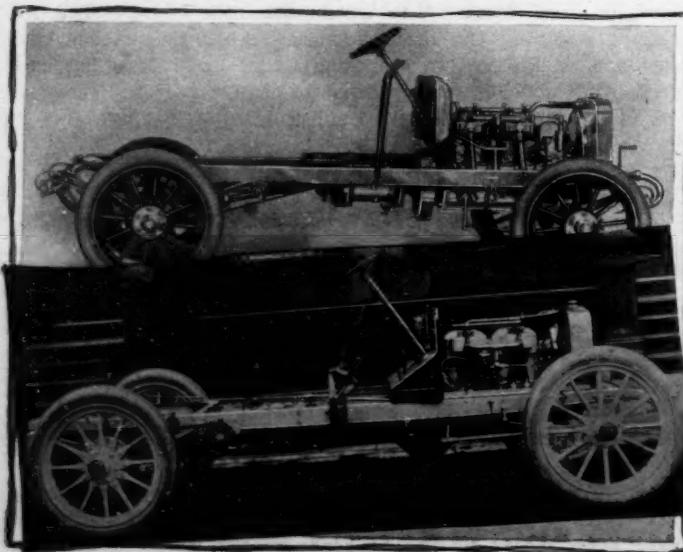


FAIRMOUNT ENGINEERING CO.'S CHADWICK CAR



STODDARD-DAYTON AND PIERCE GREAT ARROW CHASSIS

through them; the fan is carried by a bracket fixed to the radiator; a gear-driven Remy magneto takes the place of the chain-driven LaCoste type used last season; the two camshafts are not enclosed in the crankcase but are carried in four cages on the outside of the case, each cage enclosing a cam and the base of the guide for the pushrod forming the cover for the cage. In this way either camshaft can be removed without interfering with the crankcase. The exhaust piping is cut between each pair of cylinders and is joined by a right and left union, allowing any cylinder being removed without disturbing the piping connections with the other cylinders; the water pump is now placed on the front of the right camshaft and a double ignition scheme is used, with two sets of spark plugs, one set in the caps on the top of the intake ports and the other set similarly located on the exhaust ports; a steel flywheel is now used, with the spokes made like propeller blades, thereby acting in the capacity of a fan; the crankshaft revolves on five bearings and is carried on the top half of the aluminum crankcase; the carburetor as heretofore is of imported make and fashioned along Krebs lines, and the commutator is carried on the rear side of the dash and chain driven from the exhaust camshaft. Using an 118-inch wheel base calls for truss rods used beneath the side pieces of the frame. In the models exhibited a standard sliding gear set is used, but the company will fit on its machines four-speed transmission, based on the selective principle. The detachable limousine car exhibited is a good example of the

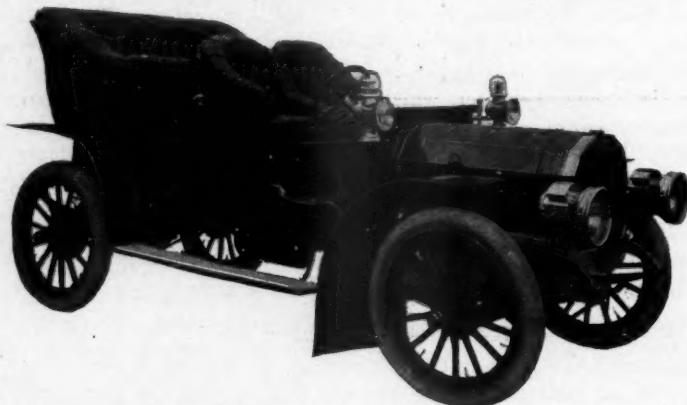


CHASSIS OF WINTON MODEL K AND LOZIER TYPE C

palatial construction seen on many of this season's machines. It is finished in pea green and black with narrow red stripings. Trimmings in the enclosed compartment are imported green gray whip-cord with figured lace, and window shades are made from semi-translucent hair-cloth. A decided novelty is introduced in an annunciator. This is a small glass-covered oblong box carried on the dash and has printed on its face a set of directions, such as left, right, home, quicker, etc., which serve as directions for the chauffeur. In the rear compartment is a keyboard with keys corresponding to each of these directions, so that in giving orders to the chauffeur the occupants have simply to press the key corresponding with a certain direction and the driver receives this direction from the glass case on the dash, electrical connections serving as transmitters. Two additional folding seats are used in this compartment. They are of the revolving type with folding back and are so designed that when not in use fold into the side of the compartment and are entirely out of the way. Other points noted about the body work are the individual front seats with the dividing compartment in the form of a leather-covered box in which can be carried tools or other necessities, and in the fitting of a storage oil tank beneath the rear part of the body.

Twyford Motorcar Co.—Twyford

A touring car, stanhope, roadster and runabout comprise the exhibit of the Twyford, the center of attraction, of course, being the big machine, which is 18 horsepower. Twelve points are made by the designer: Double traction, no steering knuckles, dust-proof transmission, rigid machinery, compensating road



WELCH CAR WITH 40-45 HORSEPOWER MOTOR

wheels, application of power, three brakes, oscillating front axle, quiet gear set, tractive force, compensation between front and rear and solid axles without steering knuckles. In the argument over the advantages of double traction, the designer asserts that it applies the power to all four wheels, enabling the car to climb maximum grades or go through any ordinary depth of mud or snow, or over unpaved streets and roads, for if one wheel gets into a hole there is the power on the other three to pull it out. In the rigid steering mechanism the steering knuckles are dispensed with, the wheels being keyed solid to the axle, so that when the wheel strikes an object in the road it will rise and pass over. The motor and machinery are attached. Shaft drive is used. The oscillating front axle allows one of the front wheels to rise 10 inches above the grade of the road and the other wheels to drop 10 inches without twisting the body of the machine. The stanhope has 30-inch artillery wood wheels, 3-inch tires, steel frame, 10 horsepower two-cylinder motor, jump spark ignition and two brakes. The roadster has the same specifications, only that the frame and axles are heavier. The runabout has an 8-horsepower motor.

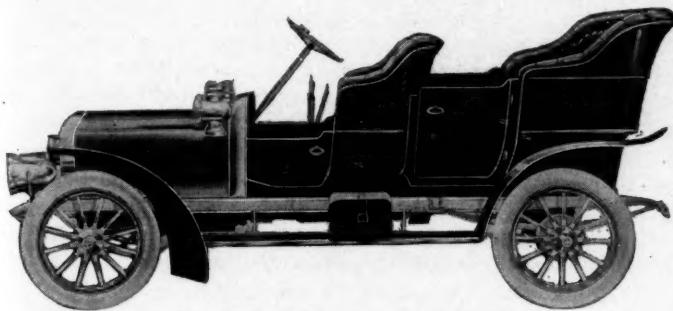
Dorris Motor Car Co.—Dorris

Designed by G. P. Dorris, the Dorris car has a vertical four-cylinder motor, two transverse arms and a central support carrying it directly on the main frame. The bore is $4\frac{1}{4}$ inches and the stroke 5 inches, with the cylinders cast in pairs and

with the valve chambers, waterjackets and heads integral. The valves are found on the tops of the heads. There are four eccentric rings on each piston. The mechanically operated valves are vertical and inverted, their stems projecting through the heads of the cylinders. The crankshaft runs in bushings made of Cramp's bearing metal and is made of a large sized drop forging. The clutch is contained in a 22-inch fan-spoke flywheel and is of the multiple disk type, operated by a pedal, and the flywheel is attached to an integrally-forged flange on the rear end of the crankshaft. The camshaft is driven in the usual manner and is of one piece, with the cams integral with it. There is jump spark ignition, current being secured from either a set of dry cells or a 6-volt storage battery. There is a quadruple vibrator coil on the dash, the coils being in units. The commutator is placed on a vertical shaft between the cylinder pairs and driven by bevel gears from the camshaft. A float feed carbureter with aspirating nozzle, a piston throttle and an automatic auxiliary air valve, are fitted. There is a finned tube type of radiator, the water running through four banks of horizontal tubes at a time. The mechanical oiler for the motor has an individual pump for each oil feed. The sliding gear type of transmission gives three forward speeds and a reverse. Direct drive is had on high speed. All speeds are obtainable through a side lever and the gears cannot be shifted without releasing the clutch because of an interlocking scheme in the gear set. Final drive is by a propeller shaft with a universal joint at each end. The pressed steel frame has straight channel section side pieces. Artillery wheels 32 inches in diameter are used, and fitted with 4-inch tires.

Aerocar Co.—Aerocar

This most recent addition to the ranks of the air-coolers shows a car that is entirely new, the company having only recently

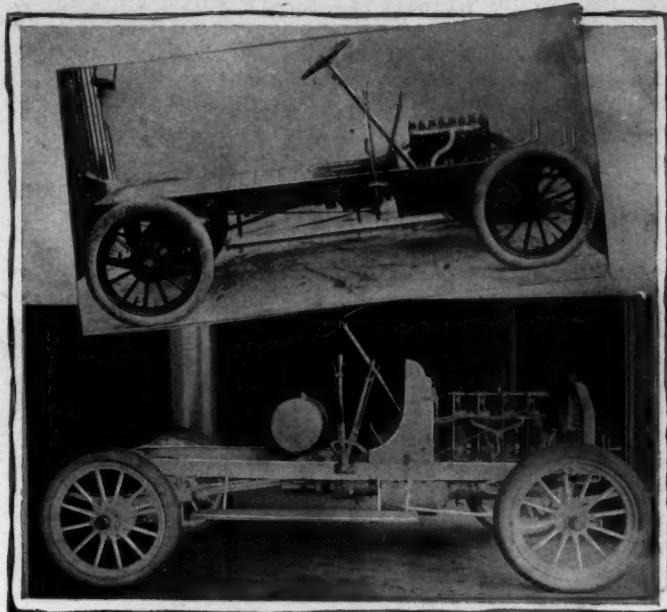


A DETROIT AIR-COOLER, THE AEROCAR

been organized. The motor is not the only thing about the machine that has received careful attention, the body being graceful in design, roomy and luxuriously upholstered. The motor develops 24 horsepower and has four cylinders. There is shaft drive and sliding gear transmission, giving three speeds forward and reverse. A leather-faced cone clutch is fitted. A four-sight lubricator is attached to the dash, which is hollow steel. The wheel base is 104 inches and the tool box is on the running board. There is a 9-inch road clearance and the wheels are fitted with 34 by 4-inch tires. The car weighs 2,000 pounds and is built for a speed of 45 miles an hour.

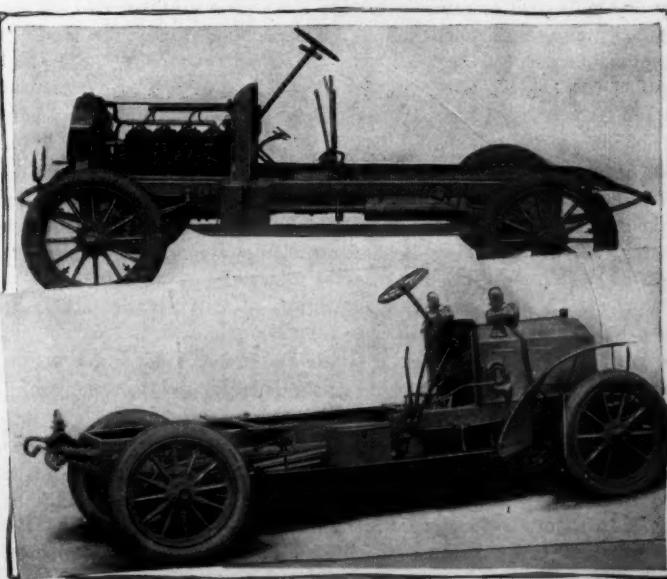
Welch Motor Car Co.—Welch

Only one chassis is turned out for 1906 by these Pontiac people, but two different types of body are furnished, a limousine and a touring car, the motor in each developing 40-45 horsepower. One of the new things noticed is the placing of the water pump in the center of the radiator, the supply coming from the top half and going to the bottom, from which it runs by individual pipes to each pair of cylinders. From the cylinder pairs a similar pair of pipes carries it to the top of the radiator. Solid construction marks the running gear, but nothing radical has been attempted. Alongside the motor at the forward end the pressed steel channel side sections are narrowed. The frame cross pieces are riveted and reinforced by gusset plates. The wheel base is 114 inches, and the body is supported in front of by a set of 40 by 2½-inch semi-



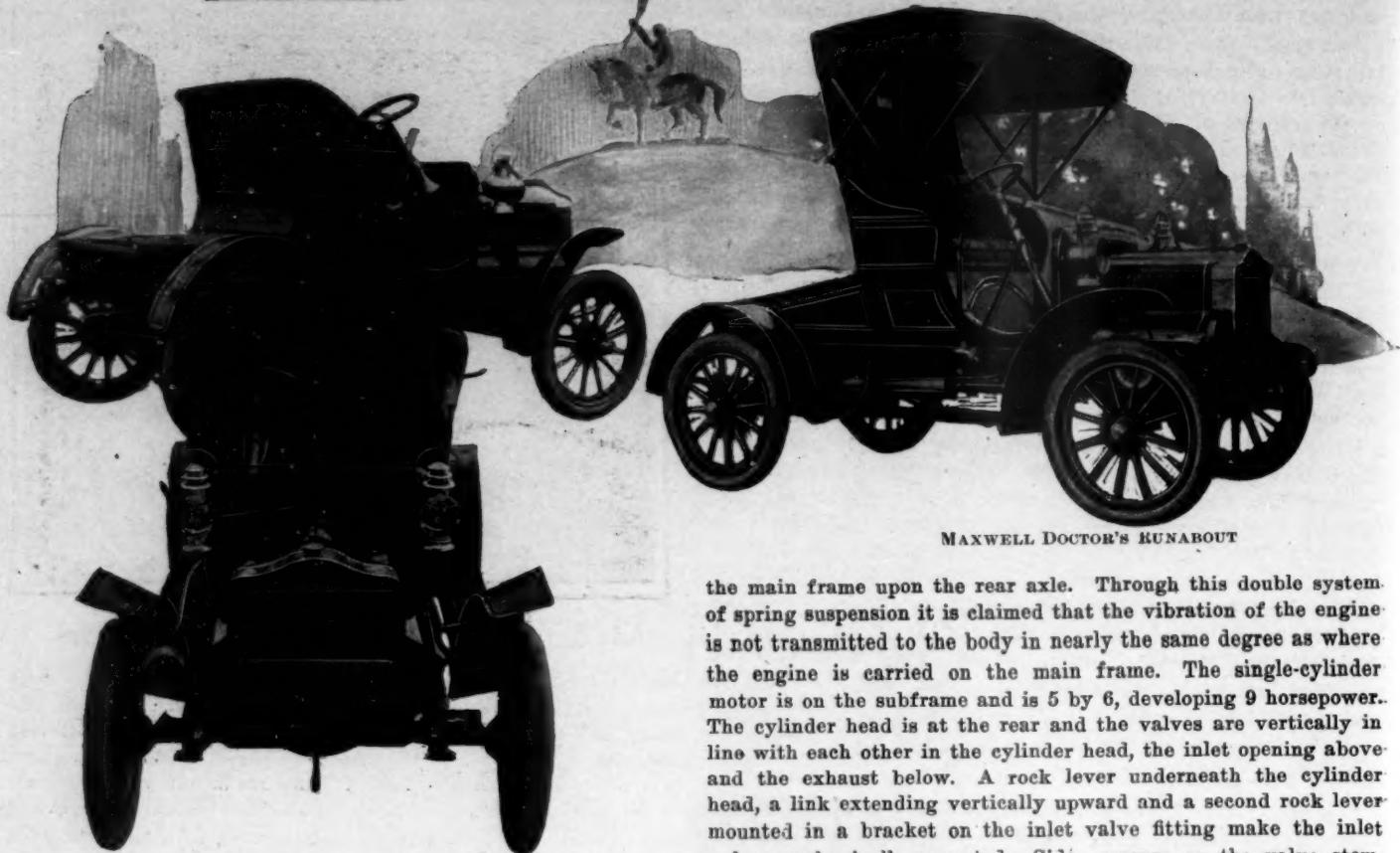
FRANKLIN AND NEW PREMIER CHASSIS

elliptic springs in front and a pair of full elliptics of the same measurement in the rear. There is a live rear axle, the front one being an I-section drop forging with the Elliott type of steering knuckles. The valves in the motor are placed in removable cages in opposite sides of the cylinders. They are mounted at 45 degrees to the vertical and are worked through an overhead camshaft and rocker arms. The cylinders are cast in pairs, with all parts made integral. The combustion chambers are of hemispherical shape, caused by the arching inside the top of the cylinders. In the top part of the crankcase, a two-part casting, are the five crankshaft bearings. There are also four integral lugs through which the motor takes its support on the main frame pieces. The oil bath is carried in the lower portion. Splash furnishes practically all the lubrication for all the motor-moving members within the crankcase. A proper level is maintained by means of an equalizer about 2½ inches above the bottom of the case. Wick oilers care for the camshaft bearings on top of the motor, while for other bearings such as the gear set there are oil baths. A Holley carbureter is fitted. Jump spark ignition is used, the spark plugs being placed angularly in the side of the arched cylinder heads, the current coming from two sets of storage batteries. A Leavitt ball timer on the rear end of the camshaft commutes the current. The control is had from the steering wheel. The gear set is based on the individual clutch principle and furnishes two for-



STODDARD-DAYTON AND PACKARD 24 CHASSIS

MAXWELL RUNABOUT



FRONT VIEW MAXWELL TOURING CAR

MAXWELL DOCTOR'S RUNABOUT

ward speeds and one reverse. Direct drive is had on the high speed without a single gear revolving and the countershaft remaining stationary. Two types of clutches are used—something new—two of the multiple disk type and one, a double clutch of the positive jaw type. Both nickel steel shafts run in bronze bearings. Lubricant is prevented from working out of the case ends by the shafts having end caps.

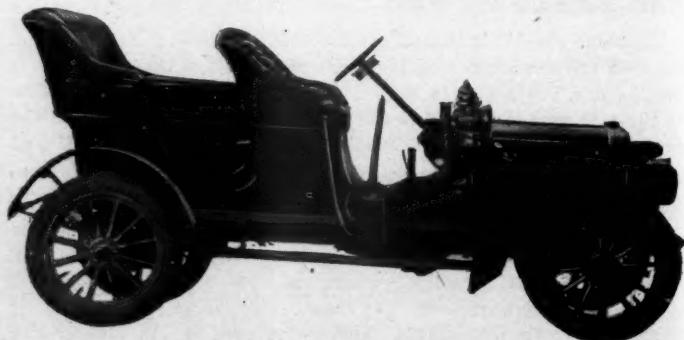
Bartholomew Co.—Glide

Models C, F and E, the first named a single-cylinder runabout, the second a two-cylinder light touring car, and the last named a standard vertical four-cylinder touring car, are the attractions here. A standard make of vertical motor, with a 4½-inch bore and 5-inch stroke is fitted to the four-cylinder 30-horsepower car, ignition being by jump spark, with the current furnished either by dry cells or a storage battery, a quadruple vibrator coil on the dash, giving high tension. A multiple oiler with four feeds is responsible for the lubrication. This model has a pressed steel frame, the engine being carried on a subframe. The wheel base is 103 inches and the tread 56 inches. The feature of Glide construction is the novel manner in which the motor, which is of the horizontal type, is carried under the seat on a subframe with three-point suspension. Wood and steel fitch plates comprise the side members of the main frame. The wood is behind the fitch plates, the whole being held together by rivets. On the inner side of the frame beam is the steel plate, extending 1 inch above the wood. A cross member, consisting of two parallel strips of steel bolted together and then to the side members, is located just forward of the middle of the frame beam. A V-shaped bracket, extending downward, is secured to the parallel strips at their middle, this forming a pivot support for the forward end of the subframe. A U-shaped piece of angle iron, which makes the sides and forward cross connections of the subframe, is connected at the ends by a cross member of angle iron cranked upwardly at one side in order to clear the chain. The side members at the rear end of the subframe are bolted to quarter elliptic springs. Full elliptic springs have a pivot joint with the frame support on

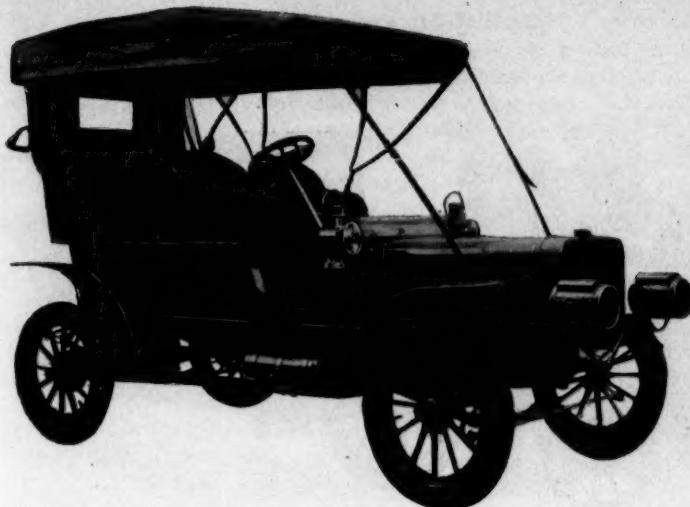
the main frame upon the rear axle. Through this double system of spring suspension it is claimed that the vibration of the engine is not transmitted to the body in nearly the same degree as where the engine is carried on the main frame. The single-cylinder motor is on the subframe and is 5 by 6, developing 9 horsepower. The cylinder head is at the rear and the valves are vertically in line with each other in the cylinder head, the inlet opening above and the exhaust below. A rock lever underneath the cylinder head, a link extending vertically upward and a second rock lever mounted in a bracket on the inlet valve fitting make the inlet valve mechanically operated. Side pressure on the valve stem, when the valve is opening, is reduced by the end of the rock lever bearing against the end of the inlet valve stem. The spark plug is screwed into the cylinder between the two valves, ignition being by jump spark, with dry cells and vibrator coil. A gear pump provides for the circulation of the cooling water. There is a two-speed forward and reverse planetary change gear, and the drive is by a single chain to the rear axle. On the two-cylinder motor, which has a 5-inch stroke and a 5-inch bore, the valves are arranged horizontally on top of the cylinders. Lubrication is effected through a pressure feed multiple oiler on top of the crankcase. The body of the four-cylinder is well designed, the front seats being divided and the rear seat accommodating three persons. By removing the rear seat it becomes a runabout.

St. Louis Motor Car Co.—St. Louis

From the new factory at Peoria come types XVI and XV, the former a 32-36-horsepower car of the St. Louis tribe and the other a 30-34. Both have vertical four-cylinder motors. Mechanically operated valves, interchangeable, are placed on the side of the cylinders, which are cast in pairs. For accessibility there are large hand holes in the side of the crankcase, fitted with aluminum caps. All steel parts are drop forged, the bearings being of special bearing bronze metal. The transmission on type XVI is of the sliding gear type, giving three speeds forward and a reverse, with direct drive on the high gear. The entire system



A NEW RIG THAT RUNS—THE ST. LOUIS



NEW FOUR-CYLINDER GLIDE CAR

is integral with the motor, giving, the designer claims, longest life, noiseless operation and maximum service without repairs. The gears are of 6-pitch. The multiple disk clutch has alternate plates of steel and bronze, closed by a self-contained spring, which is operated by a foot lever, and also released by a lever which puts on the rear hub brakes. In the construction of the radiator, which is made of flat copper tubes, it is noticed that the tubes run horizontally and are surrounded with thin copper disks, which are of sufficient capacity to take care of the work and also maintain the engine at the proper temperature at any and all times. At the rear of the radiator is a large fan which sends a strong draft through the cooling tubes. There are two sets of brakes, one connecting through the transmission and the other on the rear hubs, foot pedals and hand lever furnishing the pressure. A storage battery and jump spark system furnishes the ignition, connecting through four vibrator coils attached to the dash. The steering is by a rack and pinion device of new style, positive in action and with ball and socket joints to take up the wear. The frame is of extra heavy pressed steel and the dash of pressed steel with rolled edge. The body has a high roll back, the tonneau being roomy, with double side entrance. A large tool and luggage box is placed beneath the rear seat. The wheel base is 108 inches and the tread 56 inches, with 32 by 4-inch wood artillery wheels fitted with 32 by 4-inch tires. In general type XV resembles its big brother. Three brakes are fitted to this car, all of them powerful and acting in a quick and positive manner when applied.

Premier Motor Car Co.—Premier

Four models of four-cylinder air-cooled cars come from this Indianapolis concern, the radiating flanges accomplishing the cooling now as it did last year. The new one of the flock is model L, which has a 20-24-horsepower motor, with separately cast cylinders, the motor being placed lengthwise under the hood. The drive is through a multiple disk clutch, with sliding gear transmission and propeller shaft. Except that the wheel base is

slightly longer, the hood hinged to the dash, an additional ratchet brake and a few minor details, the runabout is the same as last year—a chain-drive car of 16-horsepower, with planetary gear set and single chain drive. Model F is a double-seated touring car with the same motor and transmitting parts, no changes being noted. The new model L has 104-inch wheel base, 32 by 4-inch tires and weighs 1,900 pounds. Valve movement is by overhead walking beam, pivoted at the center on a horizontal support, with one end of the lever pivoted to the top end of the push rod and the other resting on the head of the valve stem. The carburetor is of Premier design and has a separate float chamber and a cylindrical mixing chamber. Ignition is by jump spark, with battery current. The sliding gear set gives three forward speeds and a reverse, the drive on the high speed being direct. The steering gear is of the worm and sector type and is enclosed in an aluminum housing. In lubricating separate oilers are used everywhere but on the motor. There is an oil bath within the gear box, while the same method is employed in the differential housing and in the steering gear case. For the first time the Premier people are using a four-cylinder air-cooled motor, which is placed lengthwise where it was formerly crosswise. Four separately cast cylinders comprise the motor, the head and walls of each being integral. The mechanically-operated valves are placed at opposite sides in the heads, the valve stems being slightly inclined. Each valve has a ground fit in the head and is retained by a pair of bolts. A dozen of the usual cooling flanges care for the cylinder walls. Sixteen longitudinal vertical flanges are carried on the head and seven vertical flanges on each valve cage. Integral supporting arms, bolted to the frame side pieces, suitably offset for the purpose, are on both sides. Each hollow arm carries a screened oil hole for relieving crankcase compression, through which oil may be poured into the case, thus securing lubrication of those parts.

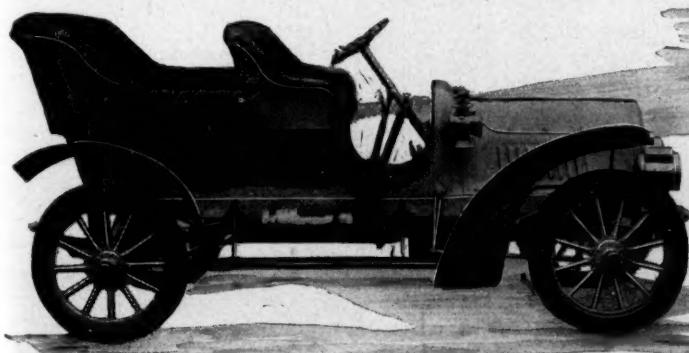
Maxwell-Briscoe Motor Co.—Maxwell

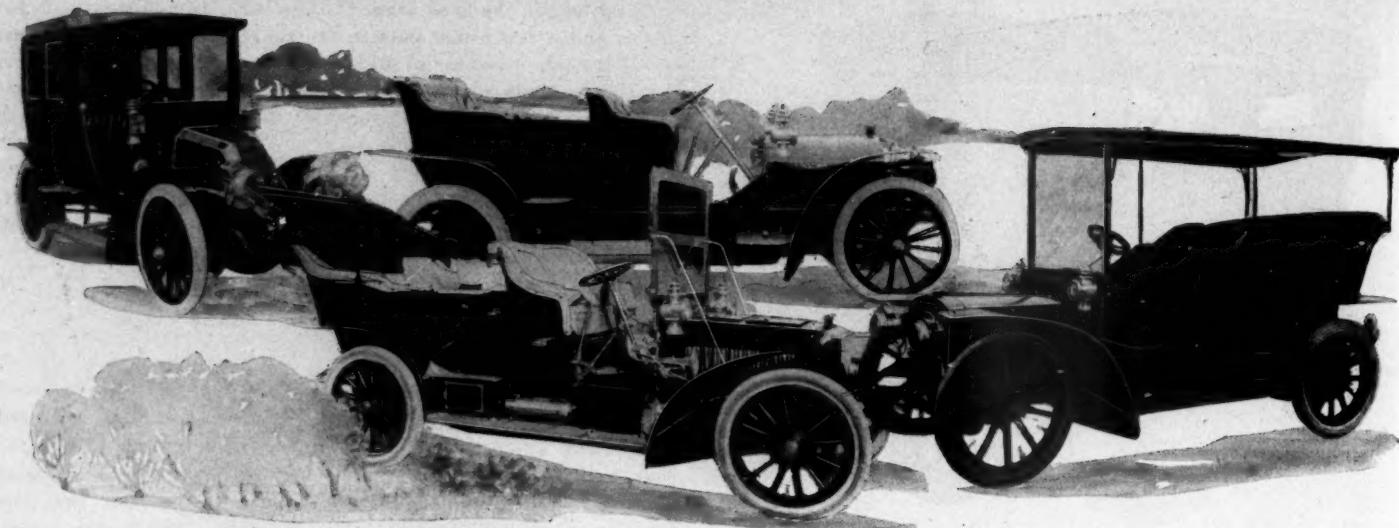
Starting with two models last year and later in the season adding another, the Tarrytown people have added to their line this year a new type of car known as the gentlemen's speedster. The chassis of the touring car, doctor Maxwell and the limousine are the same. The speedster and tourabout use the same chassis,

PREMIER DOCTOR'S RUNABOUT



PREMIER MODEL L, NEW FOUR-CYLINDER MODEL
FOUR-CYLINDER MODEL AS MADE LAST YEAR





RENAULT

PANHARD

MERCEDES

SIMPLEX

the only difference being that the compression in the speedster is greater than in the tourabout. The speedster has a motor of the opposed type developing 10-brake horsepower. The engine and transmission case consists of one aluminum casting and both inlet and exhaust valve are mechanically operated. The planetary transmission gives two speeds forward and a reverse with a maximum speed of 50 miles an hour claimed. This transmission is entirely encased and runs in oil. As on all Maxwell cars, the multiple disk clutch is fitted. Lubrication is by an automatic compression oiler, which is assisted in oiling both wristpin and crank pinion bearings by an especially designed connecting rod which throws the oil centrifugally on both bearings. The shaft drive employs two universal joints, the rear axle being equipped with roller bearings throughout. Side thrust is taken up by a blank roller of the same size as the driving pinion fitted against the smooth bevel face of the drive gear. The frame is of pressed steel and the body of metal throughout, with divided front seats of the semi-racing type. In other details the speedster resembles the tourabout. The company is also showing a 35-40-horsepower four-cylinder touring car. One of the features of the motor on this type is the system of adjusting the engine bearings without removing the engine case cover. This is done by an arrangement of set screw underneath the time case. The lines of this car have been somewhat altered from last year. The limousine has a mahogany body mounted on the chassis of the model H touring car. It is detachable, being readily converted from a limousine to a touring car. The motor of the tourabout develops 10 horsepower and is of the double opposed type under the hood. The cylinder dimensions are 4 by 4 inches.

Both inlet and exhaust valves are mechanically operated, the time case and half-time shaft on which are located the cams is removable from the engine case on which it rests. This removal makes the connecting rods and wrist pins accessible. The engine case and transmission case are unit, consisting of an aluminum casting. The planetary gear transmission gives two speeds forward and one reverse. The brake acts on drums on the rear wheels. The main engine bearings are exceptionally large and made of special bronze. The drive shaft employs two universal joints and the rear axle is fitted with Hyatt roller bearings throughout. The body is of steel, with ample space for carrying baggage and the entire weight of the tourabout, with all tanks full, is 1,000 pounds. The wheels carry 28 by 3-inch tires.

Vehicle Equipment Co.—Electrics

In addition to its commercial line, in that department of the show, the Vehicle Equipment Co. is exhibiting three styles of pleasure cars which are somewhat similar in mechanical details but which vary somewhat in equipment. They are all electrics, the brougham having a wood body with an extension front and with seating for four persons. A rocker style of frame is fitted. The car is equipped with speaking tube, driver's signal, dome lamp, foot warmer, toilet case, etc. Six speeds are furnished—four ahead and two reverse. The wheel base is 84½ inches and the tread 56 inches. The wheels are 36 and 42, with 3-inch tires on the front and 3½-inch on the rear. The landauet carries four persons and corresponds in other details with the brougham. Three persons can be carried in the victoria, which has a rear boot and top. The wheel base on this model is 93¾ inches and the tread a trifle narrower than is found on the other two—53¾ inches. On each of the three models two brakes are fitted, one foot and one electric.

Marion Motor Car Co.—Marion

In model 5 the Marion company has an air-cooled four-cylinder 24-28-horsepower touring car capable of accommodating five passengers and one that is radically different from anything the company ever before attempted, one of the innovations noted being the placing of the motor lengthwise. The multiple disk clutch, the speed change gear and the differential are in one case, while in the new brake system the foot and hand brakes are carried in large drums on the rear wheels and fastened by six bolts which pass through alternate spokes. Ball bearings are used throughout the artillery road wheels; plain bronze bearings are used throughout the motor, while Hess-Bright ball bearings are used for the fan. The crank case is a two-part casting and is made of aluminum. Ignition is had by jump spark, with 6-volt, 40-ampere storage battery. Changes of speed are made by three separate shafts, a combination which involves the straight sliding

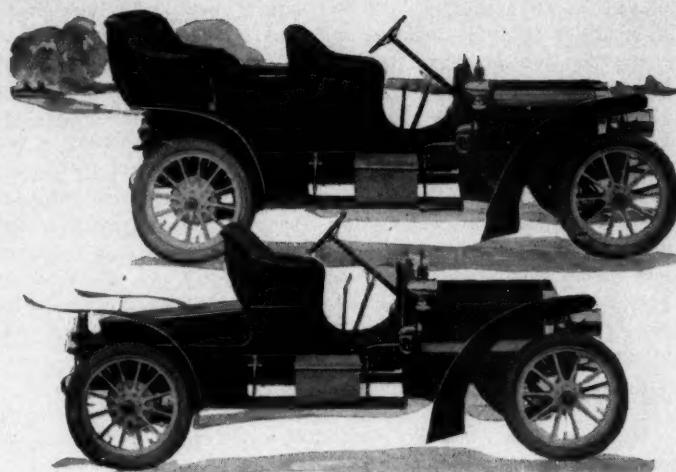


COMPOUND DOCTOR'S RIG

and selective types—selective from the intermediate speed to high and sliding from the neutral to the reverse, the neutral notch on the shifting rod being placed between the low and intermediate speeds. Four sliding units in the transmission slide two members toward each other simultaneously, thus lessening the distance traveled by each by about half. Placing the exhaust valves in the motor in domes at the top of the cylinder provides large receiving chambers for the exhaust gases. There is a new pull rod and extension arm acting on the exhaust valve spring cap, which is actuated by a roller under the exhaust valve cam. A horizontal bevel gear shaft from the camshaft drives the commutator, its shaft extending through the left side of the engine case near the second cylinder. The cylinders are cast separately. The exhaust valve dome takes the place of the flanges usual on air-cooled motors. The stroke and bore are $4\frac{1}{2}$ inches. The wood side entrance body is convertible so the car can be used for either a runabout or a touring car. The multiple disk clutch is made up of nine alternate steel and bronze disks, one set attached to the shaft coupling with the crankshaft and the other to the main shaft in the gear case. This clutch is actuated by a bronze yoke running in an oil bath.

Palais de l'Automobile—Delaunay-Belleville

On the stand of this importer, A. C. Neubauer is showing three models of the Delaunay-Belleville, which makes its debut in this country, this being the first season this car has been imported. It comes in three sizes of chassis—16, 24 and 40 horsepower. All of them are of the chain-driven type, although on the smallest model an option is given of a live axle and propeller-shaft drive. Noticeable on these models are the pipework of the engines and the system of forced lubrication. The clutch in itself is a leather-faced cone, but the arrangement of the clutch spring, its adjustment and method of operation shows originality. The gearbox has a three-point suspension and inside it is a ratchet spring, operating on the shell of the differential gear. The gasoline tank takes the place of the dashboard, being placed directly back of the bonnet, forming an inclined footboard on which are mounted two pressure gauges and the switch. The foot brake is water cooled, the water circulating through the brakeshoes. The body of the car is secured to the chassis by only four bolts, the



MARION TOURING CAR AND RUNABOUT

body slipping backward along the frame when these bolts are removed. The action of the revolving cranks on the oil in the crankcase is not solely relied upon for the lubrication of the engine, the oil never being allowed to reach a level where the cranks can dip into it. The bottom of the case slopes downward toward the flywheel, the oil in consequence collecting at that end of the chamber. It is circulated from this reservoir through all the bearings by means of a small force pump. A description of the 24-horsepower models fits the other two in all except a few details. The motor on this is a four-cylinder, 4 by 5-inch, independent type, having a crankshaft with five bearings. Four speeds forward and a reverse, controlled by a single lever, are had. The gears are fitted with ball bearings, which are used throughout the car. The front axle carries the tie rod at the rear. There is a double-threaded screw on the steering post which makes it practically irreversible. The frame is of pressed steel and is supported by two longitudinal springs in front and three in the rear—two longitudinal and one lateral. The springs in front are 39 inches and in the rear 48 inches. The ignition system consists of a low tension make-and-break magneto, and jump spark. On the 24, the wheel base is 119 inches; on the 40, 122 inches and on the 20, 116 inches. The tread on the 20 is 54 inches in front and 55 inches in the rear; on the 24, 55 inches in front and 59 inches in the rear, and on the 40, 55 inches in front and 59 inches in the rear. Side entrance bodies are fitted, of course, to this model of the French creation.

E. H. V. Co.—Compound

The product of this concern is better known as the Compound, the name indicating the character of the motor. In addition to a chassis, the company shows a light touring car of modern construction and a car known as a doctor's runabout, which is a touring chassis fitted with a runabout body with a leather top. The Compound is made with a steel frame giving a wheel base of 82 inches and a track of $56\frac{1}{2}$ inches. The frame is straight and there is no offset to the spring hangers, which carry semi-elliptical springs. The motor is hung on a subframe, supported by the front cross piece and by cross pieces just back of the flywheel and transmission case. The sliding gear set gives three speeds, the clutch is of the cone type, the oiling is by means of a mechanical lubricator on the dash, the cooling is by a gear-driven pump and tubular radiator and there are other features of well known practice. The body is of aluminum, with dashes of the same material. The final drive is by propeller shaft, but double side chains are also fitted. The Compound is not new to the automobile trade, but its working is not definitely understood by many. There are three cylinders, two high and one low pressure, cast integral, with the exception that the head of the low pressure cylinder, which is not water-cooled, has a screwed-in plate. The high pressure cylinders have 4-inch bore and the low pressure cylinder 7-inch bore, so that the area is about three times that of the high. A 4-inch stroke is em-

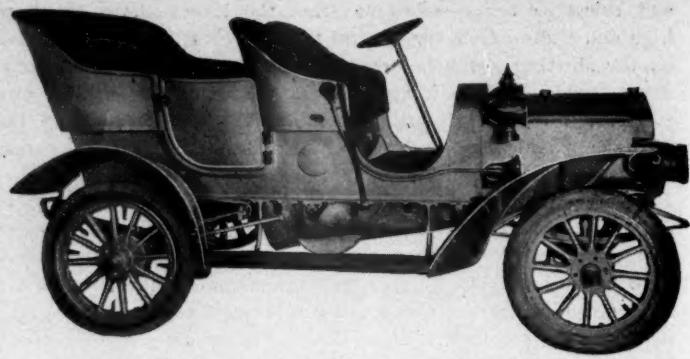


VEHICLE EQUIPMENT CO.'S LINE OF ELECTRICS

ployed in all cylinders. At the end of each explosion stroke in either of the high pressure cylinders, valves open which allow communication between the active high pressure cylinder and the low pressure cylinder. Since the piston of the low pressure cylinder has a motion 180 degrees out of phase with the high pressure pistons, the piston of the low pressure cylinder is just ready to make a down stroke when the high pressure piston has reached the end of its power stroke. The low pressure piston is then pressed downward by the exhaust pressure of the high pressure cylinders and the power-impulse is obtained from the low pressure cylinder, giving a gain in power of about 30 degrees. At the end of the stroke of the low pressure cylinder the final exhaust valve opens and the charge is exhausted into the atmosphere at a very low pressure.

American Darracq Automobile Co.—Darracq

Hemery's victory in the Vanderbilt cup race makes the Darracq stand interesting for racing enthusiasts as well as those touringly inclined, two models of the French car being shown—a 40-60-horse-power machine and a 20-32. On the high-powered car there is a new type of ball races fitted. Fitting the clutch with three small compression springs under the leather permits of the car being started on top speed. Releasing the clutch throttles the engine. Lost motion is taken up by the universal joint being divided between the gearcase and clutch. Other features of the big Darracq



LATEST MODEL PRODUCED BY THE BUICK COMPANY

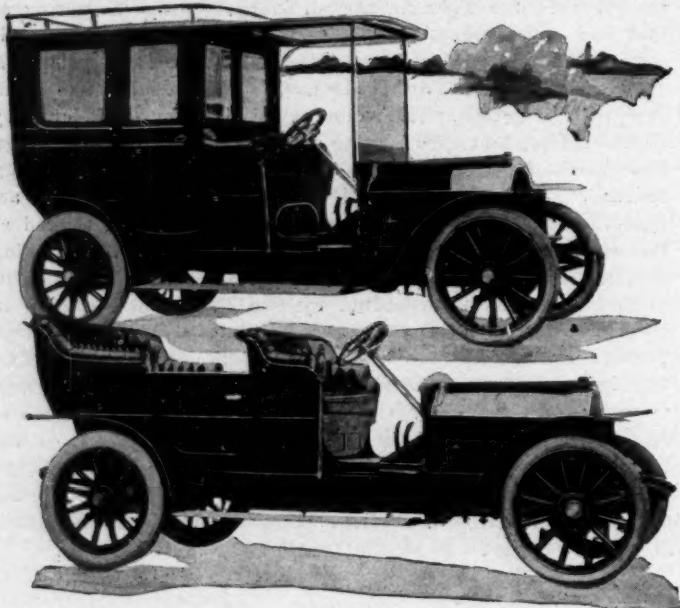
shaft and live axle. The speeds furnished are three forward and a reverse, controlled by one lever. The big car has a 125-inch wheelbase, with 11 inches clearance and a 53-inch tread, while on the other it is 120-inch wheelbase and 52-inch tread. For the big car a speed of 62 miles an hour is promised, while the other one is rated at 50 miles per hour. The 20-32 has a double phaeton body of the king of the Belgians type.

Cantono Electric Tractor Co.—Cantono

An opera bus and an extension brougham are shown to demonstrate the transforming of any type of a horse-drawn vehicle into an electric automobile, the keynote of the Cantono tractor, although completely constructed vehicles of all classes are also built by the company. The salient feature is the assembly of the motive power in a unit occupying the front part of the vehicle, doing away with the usual chassis structure. In its transforming system the point is prominently presented that one tractor can be used for as many horse equipages as its owner desires. The steering mechanism is operated by the usual horizontal hand wheel on top of the vertical column, through a fifth wheel, the entire tractor and wheels turning, as is common to horse-drawn vehicles. The steering-hand-wheel controls the steering in the strict sense of the word. That is, the driver requires no muscular effort to turn the tractor on the fifth wheel. Instead, the steering mechanism automatically controls an electric and mechanical interlocking device, not operating simultaneously, but constantly protecting one another, the only effort of the driver at the steering wheel being that of manipulating the steering. This manipulation is not through any parts coming up through the steering column, but through the lower end connections of the column. The tractor is supplied with reach rods extending back to the rear axle of the attached body, to take the tractive strain from the body construction.

Pungs-Finch Auto & Gas Engine Co.—Finch Limited

Under the name of Finch Limited the old Pungs-Finch touring car is shown with a 110-inch wheel base, 56-inch tread and 34-inch wheels fitted with 4-inch tires. There is a four-cylinder vertical motor developing 50 horsepower, with the cylinders 5 $\frac{1}{2}$ by 6 $\frac{1}{4}$ inches. The tonneau body has side entrances and the car weighs about 2,650 pounds. The feature of the sliding gear is that the lineshaft loose first pinion is always driving the side shaft. This in turn furnishes the motive power for the second speed gear which is free on the lineshaft. There is a solid jaw clutch be-



DARRACQ COUPE LIMOUSINE AND TOURING CAR

are flexible brass water connections throughout, white metal bearings, gun metal finish on the cylinders and a Mercedes type of hood, which opens on the side. On the smaller model the clutch is a leather-faced cone with springs beneath the face to permit of easy engagement. As the clutch is connected with the throttle its disengagement throttles the engine to prevent racing. On both models the front and rear axles are the same, the former being an H-section steel forging and the latter a live axle running in a sleeve on double ball bearings. Both brakes are of the internal expansion type, acting on the cardan shaft and rear wheels. The frames are of pressed steel, with a new type of tubular radiator. The four cylinders on the motor are cast in pairs, the bore and stroke of the 40-60 being 5 by 5-inch and, on the 20-38, 4 $\frac{1}{2}$ by 4 $\frac{1}{2}$ -inch. Irreversible and adjustable steering gear is used and the lubrication is by means of a small paddle pump driven off the camshaft through sight feeds to the crankcase. Two types of ignition are furnished—high tension by coil and battery and by a Simms-Bosch low tension magneto. In the control system the throttle lever is on a fixed rack on the steering wheel, although it does not turn with the wheel. There is a change gear handle on the side. The transmission on the big car is of the sliding gear type, as is that on the other one, with drive through a cardan



NEW NORTHERN FOUR-CYLINDER 30-HORSEPOWER CAR

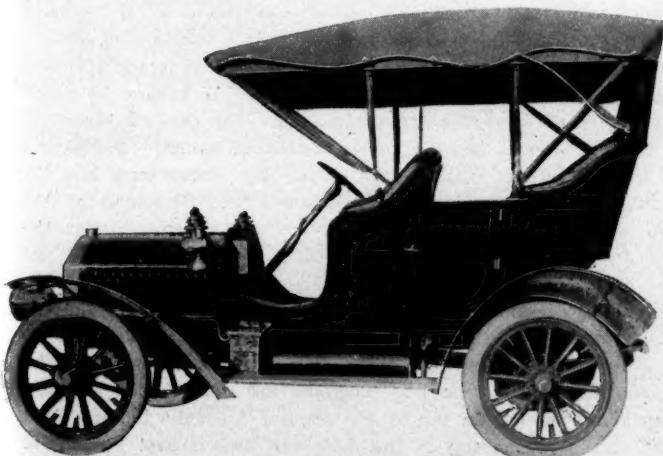


CANTONI ELECTRIC TRACTOR ATTACHED TO CARRIAGE BODY

tween the high speed and the second speed gear engaging either at will or standing neutral between the two. The low speed and reverse are had by sliding gears at the rear of the high and second speed, making a clutch engagement of the latter so that the speed gear can be instantly changed either up or down between the high and second. In the motor the valve lever pins are placed on top of all 13-16 inches above the camshaft which is bevel gear-driven by a vertical shaft carried in ballbearings. The cams work on hardened cam rollers and the valves stand at an angle of 45 degrees to each other. They are crowned and all have 45-degree angle seats. The transmission lineshaft is driven from the crank-shaft through a free solid-jaw clutch. The leather-faced clutch has a string of balls which takes the spring thrust. Steering is by means of a shaft which terminates in an integral quadruple threaded screw engaging a nut which works the bellcrank steering action. The brake scheme is by exterior bands on the rear hub drums for the ordinary brake, and internal bronze shoes, metal-to-metal, inside the same brake drums for emergencies.

Buick Motor Co.—Buick

With one addition to their line the Buick people make a brave front with four different types exhibited—Model C, last year's touring car, with 22-horsepower motor and carrying five passengers; model G, a runabout with the same horsepower; model S, another touring car with a vertical radiator, and model D, the latest addition, a 30-35-horsepower car with a capacity for five people. D has 32-inch wheels and G, S and C 30. The adoption of a four-cylinder vertical motor on model D by the Buick people is something new for them. This motor develops 30-35 horsepower, with a 4½-inch bore and 4½-inch stroke. The engine and gearbox are carried on a flexible five-point suspension, which results in the shaft always being in alignment. The cylinders, pistons and rings are ground. The valves are mechanically operated and interchangeable and the ignition is by jump spark with

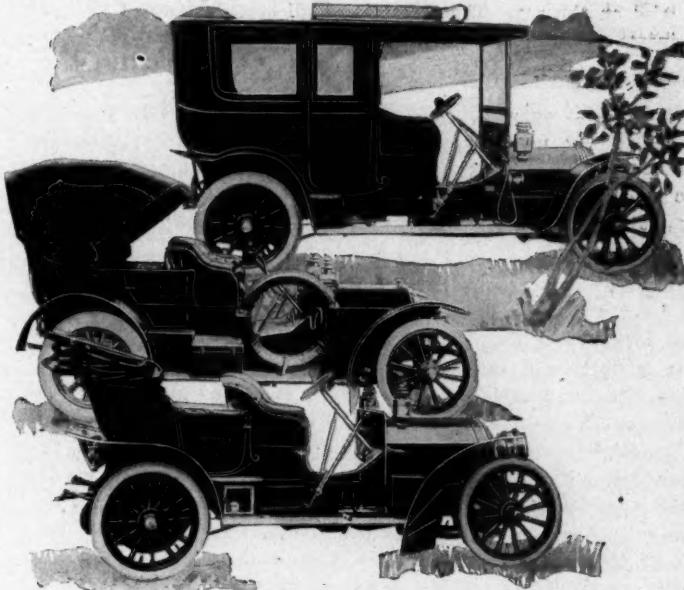


PUNGS-FINCH CAR, THE FINCH LIMITED

current from a storage battery. The sliding gear transmission gives three speeds forward and a reverse, and direct shaft drive is employed. The frame is of cold rolled pressed steel and the wheelbase 100 inches. The tires are 32 by 4 inches. Two brakes are fitted, one being on the driving shaft and the other an emergency internal expansion on the hub drum. Room for five is had. Model F is somewhat like model C of last year, which is also retained. Like C, there is a 22-horsepower motor, but a vertical radiator is featured. The motor is two-cylinder double opposed, the cylinder bore being 4½ by 5 inches. It is so constructed that every part is accessible from the top. The valves and ignition are the same as on D, but planetary transmission is used, giving two speeds forward and reverse. There is also a new mechanical sight feed lubricator, while the frame is of angle steel. The wheelbase is 87 inches and 30 by 3½-inch tires are fitted. The brakes are of the internal expanding type. Model C, last year's leader, has not been altered any, still retaining such features as a double opposed two-cylinder motor and developing 22 horsepower. While model G is a runabout, its specifications and equipment are the same as are found on model F.

Hollander & Tangeman—Fiat

There is exhibited a 35-horsepower polished chassis, a 60-horsepower, seven-seated open touring car, a 24-34 horsepower with Berline de Voyage body, a 24-32 Hol-Tan victoria and



FIAT LIMOUSINE, COUPE AND TOURING CAR

also a 24-32-horsepower Demorest limousine. These will be changed during the show for cars that are expected to arrive on a late boat. The Fiat designer has placed four cylinders in the motor, casting them in pairs and with waterjackets made integral. Aluminum is used extensively to save weight in the motor, and in addition the gears are enclosed in an aluminum casing. The Fiat radiator is of the honeycomb type, suspended in a manner designed to prevent shocks and vibration. A half-speed shaft mechanically operates the lubricator, which is fitted to the dash. This oils cylinders, crank bearings and wrist pins at every revolution. The rear wheels are driven through chains. The transmission is of the sliding gear selective type, giving four speeds forward and a reverse. The case is ball bearing and made of aluminum, with the gears made of hardened steel which have been ground in mesh in emery and oil. This is the same transmission the Fiat people have used for the last 3 years. The clutch is of the multiple disk type, fifty tempered steel disks revolving constantly in an oil bath, obviating shocks to the transmission. There is only one adjustment on the clutch—the tightening of the thrust springs which increases the friction. Four brakes are fitted. One is upon the driving shaft, and another upon the differential, both



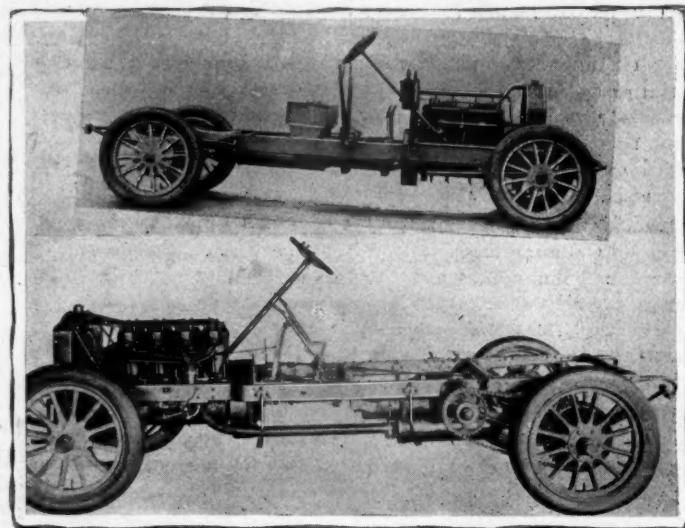
LANE 15-HORSEPOWER STEAM CAR

actuated by one foot pedal. Each of the rear wheels has one, actuated by a hand lever through an equalizing device. The rear wheels can be locked at any time by either hand or foot. The brakes are water-cooled as a result of the experience gained by the Fiat demonstrators over the mountain roads of northern Italy. The gasoline tank, with a capacity of 30 gallons, is placed in the rear and beneath the chassis and integral with it. Both the front and rear axles are one-piece forgings, untempered. The ignition is of the magneto-electric, make-and-break type, the Simms-Bosch magneto being used. In all there are not 5 feet of wire on the car. The frame is of all steel, strangled in front to insure the widest possible steering angle.

Haynes Automobile Co.—Haynes

Except that 28-30 horsepower is developed, that the bore and stroke are $4\frac{1}{4}$ by 5, instead of $5\frac{1}{8}$ by 6, and the cylinders are cast in pairs, model O is the same as model R in the Haynes line. The weight is 2,200 pounds, wheel base 97 inches, tires 4 inches, body of French tulip design and a 48-inch tonneau seat. The model R engine has four vertical cylinders cast separately and develops 50 horsepower. The waterjackets are cast integral and the inlet and exhaust valves are on opposite sides, turned from solid nickel steel alloy drop forgings. The intermediate reducing gear is fiber-lined to silence the noise of the gears. Reducing gears, cams and camshafts are housed and oiled by splash from the base. No subframe is used, the engine being hung directly to the steel frame by arms cast integral on the upper half of the crankcase, which allows the lower half to be removed, giving access to all internal parts of the engine. Camshaft housings are external. The arrangements of the piston ring construction consist of three rings, one 7-16-inch wide and $\frac{1}{8}$ -inch thick, over which are fitted two 7-32 by $\frac{1}{8}$ -inch rings, with their openings on opposite sides of the under ring, which constantly expands the outer rings for the purpose of securing perfect compression. Three sets of these triplicate rings are fitted to each piston. With the wrist pin, which is held in position by a single ring in a fourth groove, this makes a total of ten rings to each piston. The connecting rods are of I-section steel drop forgings and the crankshaft of special high carbon steel, with a tensile strength of 100,000 pounds, and an elastic limit of 70,000 pounds. The camshafts are of drill rod and the cams of case-hardened steel. A mechanical force feed oiler with an individual pump to each lead pipe lubricates the engine, the transmission runs in a bath of oil, and the universal points and the housing for the driving mechanism of the rear axle are packed in grease. Jump spark ignition is fitted with one set of dry cells, a storage battery and a place for a magneto if one is desired. The Haynes water pump is gear-driven, a cellular radiator with a large cooling surface being fitted. Two fans are used—one back of the radiator and the other in the flywheel. In the Haynes patented master clutch is cast from bronze a hub bearing four radial arms, each terminating in a fork; integral on these arms is a $10\frac{1}{4}$ -inch pulley with a $1\frac{1}{8}$ -inch face. The hub is turned to a bearing for the end of crankshaft, while the arms extend to the inner rim of the flywheel, on which are cast four lugs, one resting between each fork.

Stiff coil springs are fitted, one on each side between the lugs and forks. Revolving loosely around the face of the pulley is a steel band, the hub of which is keyed to the transmission shaft; this band is split crosswise, one end attached to an arm from its hub, the other end to a lever which, when actuated by a cam controlled by the foot lever, constricts the band on the pulley and thus transmits the power from the engine by way of the lugs on the inner rim of the flywheel through the springs to the arms, thence to the pulley which revolves the constricted band and carries the power to the transmission shaft. The coil springs effectually cushion the transmission, driving mechanism and all keys from the shocks and racking effect caused by sudden application of high power. The pulley and band arrangement enables the operator to pick up the car without a jar or tremor. Located under the front foot board, the clutch is readily accessible for adjustment. In the hub of the transmission master gear on the



CHASSIS OF THE CHADWICK AND THOMAS FLYER

countershaft is a ratchet pawl device, which permits the car to coast with middle or low gear engaged, until the speed of car and engine are equal, when the pawls engage the ratchet and the engine takes up the load. Thus a change may be made from high to middle or low gear, without any possibility of burring or stripping the gears. The universal joints are different in principle from those in common use. Two drop forged steel forks, with broad flat inner faces, are formed; a flat-faced square steel block is fitted perfectly between these forks and is held in position by pins running both ways through block and through forks. The driving friction is exerted on the flat inner faces of the forks and surface of the block, no strain being thrown on the pins. Both forks and block are case hardened.

Lane Motor Vehicle Co.—Lane

The Lane steam car with a rated horsepower of 15, is built with a pressed steel chassis frame, 97-inch wheelbase, 32 by 4-inch double tube tires, and has, as its power generator, a cross-compound engine with cylinders $3\frac{1}{4}$ and $5\frac{1}{4}$ inches in diameter and with a $3\frac{1}{2}$ -inch stroke in each. The general layout of the chassis is such that the boiler is located beneath the bonnet and immediately in front of the dash. The water tank is a little in advance of it, and the condenser is still ahead of the tank. The engine is placed in an inclined position under the front footboard and the gasoline tank is carried beneath the front seat. Transmission from the motor to the center of the rear axle is direct through a single chain. A service brake for regular use is placed on the equalizer wheel and emergencies are placed within the rear wheel hubs. The boiler is of the combination spiral tube and vertical fire tube type, a spiral group being carried on top of the regular fire tube boiler. Feed water enters at the top of the flash coil and is first heated by the spent gases that are too cool to be of further use against

the hotter parts of the tube boiler below. The water passes continuously from the upper coil through each succeeding coil below and is heated more and more as it comes in contact with the hot surfaces until it issues from the bottom coil as steam and water into a centrifugal separator. From the top of this separator the steam that has been generated passes to the upper part of the shell or fire tube boiler and the water by gravity goes to the lower part of this boiler. The water is soon transformed into heat by getting among the hot firetubes in this boiler and the other steam in the top of it is heated still further. Tubing is used exclusively in the burner and the mixing tube exceeds in length the diameter of the burner. The flames are arranged in straight rows with air currents between them, thus securing a good mixture of air and vapor and permitting of plenty of oxygen being obtained. In lighting the burner a little wood alcohol is first poured into a cup-shaped receptacle which serves to saturate the torch, which is ignited through a door in the side of the casing. The fuel is then turned on and is immediately vaporized by the heated pipes and is ignited by the torch. In the engine the steam chests are adjacent to each other and between the cylinders and slide valves control the passage of steam to the cylinders.

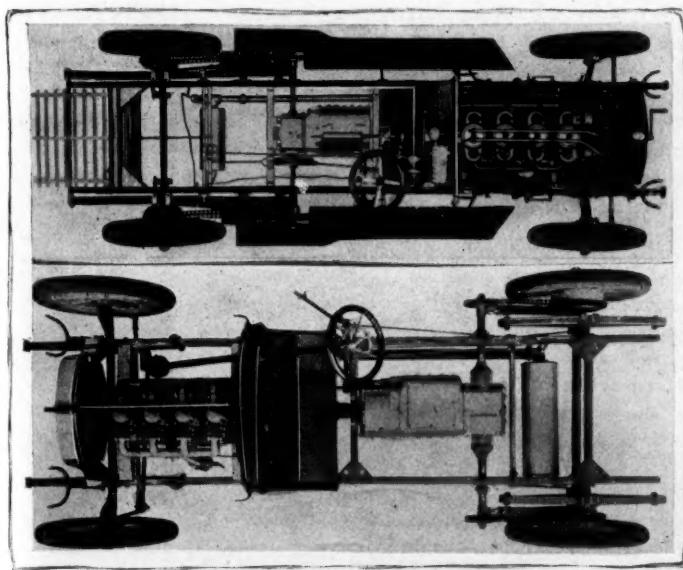
Nordyke & Marmon Co.—Marmon

With two strings to their bow in the shape of a four-cylindered touring car and a runabout, both of them with air-cooled motors, the Marmon people make a pleasing front. The same motor is used on both models, only in the runabout the bore is $4\frac{1}{4}$ inches and the stroke 4 inches, while in the big car the combination is $4\frac{1}{2}$ by $4\frac{1}{2}$ inches. The bore and stroke last year was 4 by 4 inches. Increasing the diameter of the brake drums from 10 to 14 inches is one of the new things in construction. Rear axle sleeves are made from one piece, with a varying diameter instead of in two sleeves joined by a bushing. The cylinders are set in pairs at 90 degrees to each other, the cooling being done by circular flanges. The double frame suspension has a three-point support for each part. Full elliptic springs are found both front and rear. The frame, motor and gearbox are the

on the same axis, the apex of the inner frame is able to swing as if on one bearing. This construction is adopted to secure a frame that will be free from strain when one of the wheels is raised from the ground by an obstruction. The wheel base is 90 inches. The steering knuckles are of the Elliott type and Timken roller bearings are fitted to the road wheels. In the motor the cylinders are mounted V-like, with those on the left at right angles to the other pair. Mounting them this way makes the motor a shade longer than a two-cylinder motor. The crankshaft and the adjacent throws are set at 90 degrees to each other, thus securing the same regularity of explosion as is had when all the cylinders are placed vertically and the crank throws placed at 180 degrees. The valve cages now bolt onto the heads instead of resting in openings in them. Exhausts and inlets are mechanically opened. They are placed side by side in separate cages on the cylinder heads. Both sets of valves are cared for by one camshaft. This is found in the top angle of the crankease, being driven through a pair of large half-time gears housed in a compartment in front of the crankease. The carburetor, of new design, is found on the forward left part of the motor. An individual pipe runs to each cylinder, the intake pipe connecting the carburetor and the cylinder branches, one of which passes to the right and the other to the left, and again separating. Ignition is by jump spark. The planetary gear set gives two forward speeds and one reverse. There is a pair of internal expanding brakes carried in dust-proof drums on the rear wheels.

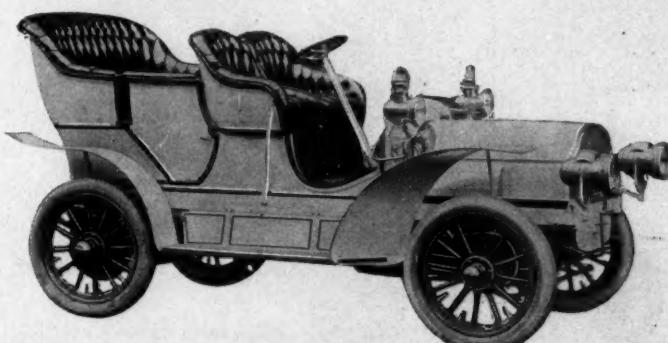
Corbin Motor Vehicle Corporation—Corbin

The Corbin exhibit presents the line of air-cooled automobiles in its entirety. The feature is an exhibition chassis with highly polished parts, completely assembled. A comprehensive display of parts, finished and in the rough, sectional and complete, are shown to emphasize the features of Corbin mechanism. Three finished cars are shown. Model E is a light touring car for five passengers, 24-horsepower, and weighs 1,800 pounds. Model E is a limousine. Model G is a 24-horsepower, two-passenger car weighing 1,600 pounds. The color scheme is a rich Venetian green, artistically paneled. The upholstering is in red leather. The design of the motor resembles certain leading foreign makes of cars. With these features, the Corbin people have incorporated their well-known principle of air-cooling the motor. Radiating surface is obtained by the Corbin patented system of inserted steel combs. The valves are located in the cylinder head in detachable cages. All valves are mechanically operated from a single camshaft on the exhaust side of motor. The inlet side of motor has large hand holes in the crankease, the covers of which can be detached in a few seconds and access to the crankshaft bearings and connecting rods gained. The motor crankshaft is provided with five bearings, one between each throw, the end bearings being of Hess-Bright construction. Connection is made between the motor and transmission by means of a self-adjusting, enclosed, conical clutch. The transmission has three forward and one reverse speed, of the sliding gear type, operated on the selective system, with a direct drive on the third gear. A distinctive Corbin feature is the method of supporting the motor and transmission, the main casings of

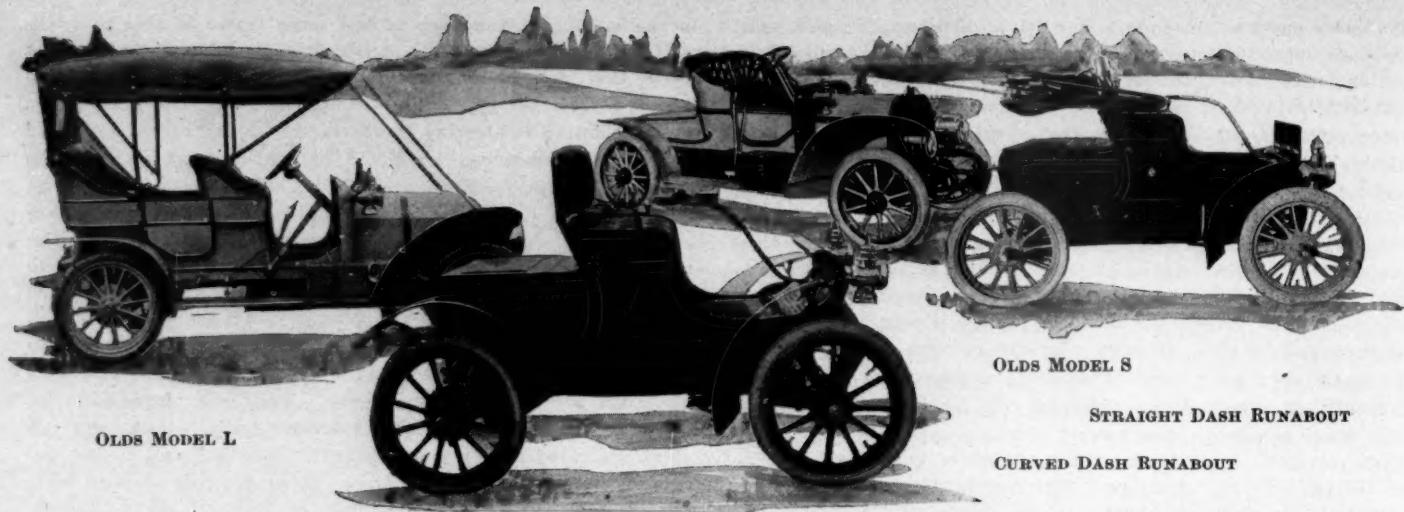


APPERSON AND MARION CHASSIS

novel points about the Marmon. The body frame is rectangular in shape and is made of pressed steel, with wood reinforcements. There are three points of support for it—two in the rear, where it is pivoted to the top centers of the back pair of springs, and the other in front, where a trunnion carries it on the triangular frame. This latter carries the motor and transmission parts. In front this subframe is pivoted to the tops of the front pair of springs and in the rear it is carried in two other bearings. Both of these being



THREE-POINT SUSPENSION MARMON CAR



OLDS MODEL L

OLDS MODEL S

STRAIGHT DASH RUNABOUT

CURVED DASH RUNABOUT

which are bolted together, making a rigid unit. This unit is flanged its entire length and bolted to a formed sheet metal pan, which is in turn riveted to the frame side members and serves the double purpose of supporting the weight of the power plant and protecting the parts from dirt and moisture. The drive from transmission to rear axle is through a double universal-jointed propeller shaft. The joints employed are new in design. The rear axle is bevel gear driven and of the semi-floating type. The brakes are all on the rear axle, consisting of internal and external brakes on the hub drums. The front axle is of I-beam section drop forged in one piece. The irreversible steering mechanism is of the worm and sector type, and the gears are cut by the Hindley system. All moving parts of the steering mechanism, including the wheel pivots, are ball bearing. The spark and throttle levers are on top of the steering wheel but do not turn with it. The wheel base of model E is 100 inches; that of model G, 93 inches. The wheels are 32 inches in diameter, carrying 3½-inch tires.

Olds Motor Works—Oldsmobile

A four-cycle four-cylinder car, model S; a two-cylinder two-cycle, model L, and a runabout, model B, are on the stand of the Lansing concern. Model S is the first car with the motor beneath a forward bonnet put on the market by the Oldsmobile people. Other features in this model are cone clutch, sliding gear transmission and shaft drive. There is a large five-passenger, double side entrance body with a hollow dash. Motor and gear box are suspended from a subframe carried on cross pieces of the main frame, each part having integral lugs for the purpose. The front axle is of a standard tubing, slightly dropped in the center between the spring seatings. The rear axle is of the divided type, with Timken roller bearings used in the wheels

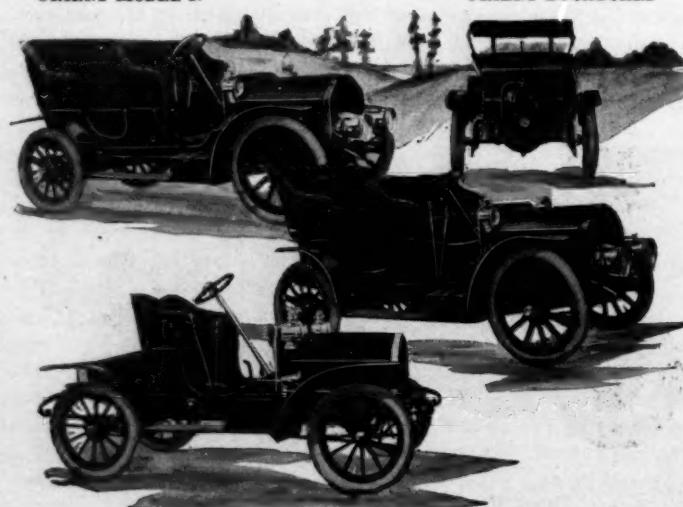
and rear axle bearings. The wheel base is 106 inches, the weight 2,200 pounds and 32 by 3½-inch tires are fitted to both sets of wheels. The motor has the cylinders cast in pairs, with the water jackets, valve ports and cylinder heads made in a single casting. The valves are carried in ports on the left side, the inlets and exhausts being on the same side, requiring only one camshaft for actuation. The horsepower is 24-26, with a 4½-inch bore and a 4¾-inch stroke. Ignition is supplied by either dry cells or storage battery, with the coil on the dash and the commutator on the rear of the motor. A four-unit coil is used. Motor cooling is accomplished by a water-radiating system and fan immediately in the rear of the radiator. Oil is delivered to each of the crankshaft bearings from a separate lead from a positive oiler. A float feed carburetor is fitted, while transmission of power is had through a friction clutch of standard design. The gear box, an aluminum casting, is carried on the subframe, three brakes are used and steering is through a worm and nut gear on the bottom of a well inclined column. Model L has a two-cylinder, two-cycle vertical water-cooled motor, also under the bonnet, giving 20 to 24 horsepower. Lubrication is by the Hill oiler. Sliding gear, three speeds forward and a reverse, is fitted. The control is of the selective type, operated by a single lever. The drive is through a 1¼-inch shaft and Speer universal joints to the rear axle. Timken roller bearings are on the rear axle. The wheel base is 102 inches and the tires 30 by 3½ inches. The muffler runs longitudinally beneath the car, while the brakes are of the internal expanding type.

Logan Construction Co.—Logan.

On the two large pleasure cars, with accommodations for four and five passengers, are Logan two-cylinder opposed water-cooled motors, while the two-passenger runabout is fitted with an opposed air-cooled motor carried crosswise beneath the bonnet and propelled by a combination of shaft and single-chain drive. On the water-cooled cars single-chain drive from the engine shaft is used. G and H are the water-cooled cars, G having 4¾ bore and 5-inch stroke and 20 horsepower and H 5½ by 6 and 30 horsepower. F, the air-cooler, has 10 horsepower. Sliding gear with two speeds ahead with direct drive is fitted to all three cars. Final drive through a single chain remains a feature. G has a 90-inch wheel base, 30 by 3½-inch tires and weighs 1,655 pounds; H has a wheel base of 100 inches and wheels 32 by 4 inches, the weight being about 2,150 pounds. All parts of the Logan frame are riveted, the frame being made of angle steel, the angles having a wall thickness of ¼-inch and the angle arms being 2½ by 1½-inch. Axles are made from steel tubing and the spring suspension is a full set of four elliptics. In the water-cooled models the horizontal motors are placed lengthwise beneath the body at the left side. The mainshaft of the sliding gear set is in line with the crankshaft and the drive to the rear axle is direct by a single chain. The crankshaft or camshaft gear can be removed without being dismantled because the

ORIENT MODEL N

ORIENT BUCKBOARD



ORIENT MODEL K

ORIENT MODEL R

motor crankcase is in three parts. Automatically operated, the inlet and exhaust valves are $1\frac{1}{2}$ inches in diameter. Mechanical oilers are used, the drive to them being through ratchet and tappet from the camshaft. Dry or storage cells furnish the current for the jump spark ignition. Cooling is aided by a gear-driven pump and the carburetor is of the float-feed type. The radiator is of the tube variety. Air-cooling motors and runabouts are new with the Logan people. Their runabout weighs 900 pounds, has a 90-inch wheel base, 28 by 3-inch tires and a standard tread. Medium-gauge steel tubing forms the front axle, the Lemoine type of steering knuckle being carried in the usual form. Ball bearings are fitted to the front wheel and Hyatt rollers to the back. In the motor both sets of valves are mechanically operated and are located in ports in the cylinder heads. The cylinders are $4\frac{1}{8}$ by $4\frac{1}{8}$ inches and 10 horsepower is developed. Splash lubrication is used.

Waltham Mfg. Co.—Orient

In addition to the well-known buckboard, the Waltham Orient line consists of models K, L and M, with 14-16-horsepower motors, and models N and R with 18-20-horsepower motors, all air-cooled. Model K is a runabout, model L a touring car, with a tonneau with revolving seat entrance; model M a touring car with detachable tonneau and rear entrance; model N a touring car with side door entrance, and model R a touring car with de luxe body and side door entrance. All models have four cylinders placed vertically in tandem. Each bearing has four shims, each .002-inch thick, to allow for wear. Composition caps and $\frac{1}{2}$ -inch studs are used on the crankshaft bearings. The 14-16-horsepower motors have a bore of $3\frac{1}{4}$ inches and a stroke of $4\frac{1}{4}$ inches. The 18-20-horsepower motors are of 4-inch bore and $4\frac{1}{4}$ -inch stroke with crankshaft $1\frac{1}{4}$ -inch diameter and five long, plain bearings. All cylinders are lapped by lead to a glass finish. The governor throttle stem is supported by a long bearing to prevent cramping. The commutator, LaCoste, with wipe contact, manufactured in France especially for the Waltham-Orient, is made dust proof by leather washers under the front cap, and the insertion of a bicycle oiler into the oil hole. The crank cases have two air vents and inlet chamber caps are threaded for metric spark plugs. The carburetor is of the company's own make, automatic, with outside primer at front of the car. There is also a priming cock on the inlet pipe. All models have sliding gear transmission with three speeds and reverse. Both shafts are squared and all keys are pinned to the shafts. The main countershaft gear has a positive return by means of a 75-pound spring. All gears are hardened steel. All clutches are cone-shaped, leather-faced, releasing forward, accessible and easily removed. The frames are pressed steel 4 inches deep with tapering ends. Motors and transmission are supported on subframes with all joints hot riveted. The front axles, throughout, are solid round toughened steel. Divided live axles are used in the rear with ball bearings at the inner ends and roller bearings at outer ends. Differential gears and pinions are made of machined steel, case hardened. Steer-

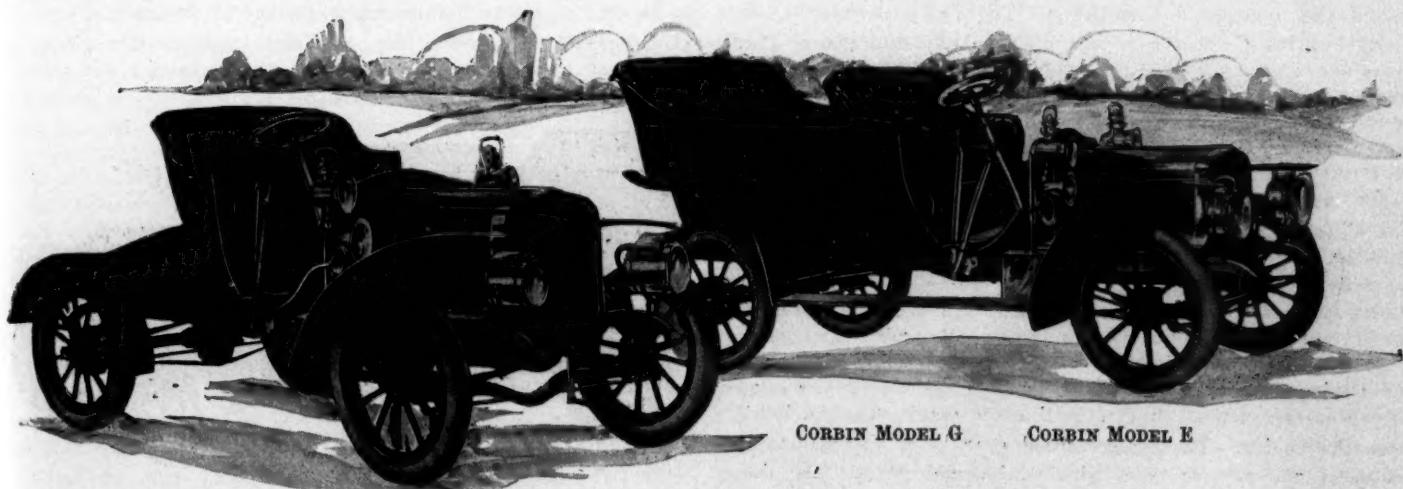


LOGAN TOURING CAR AND RUNABOUT

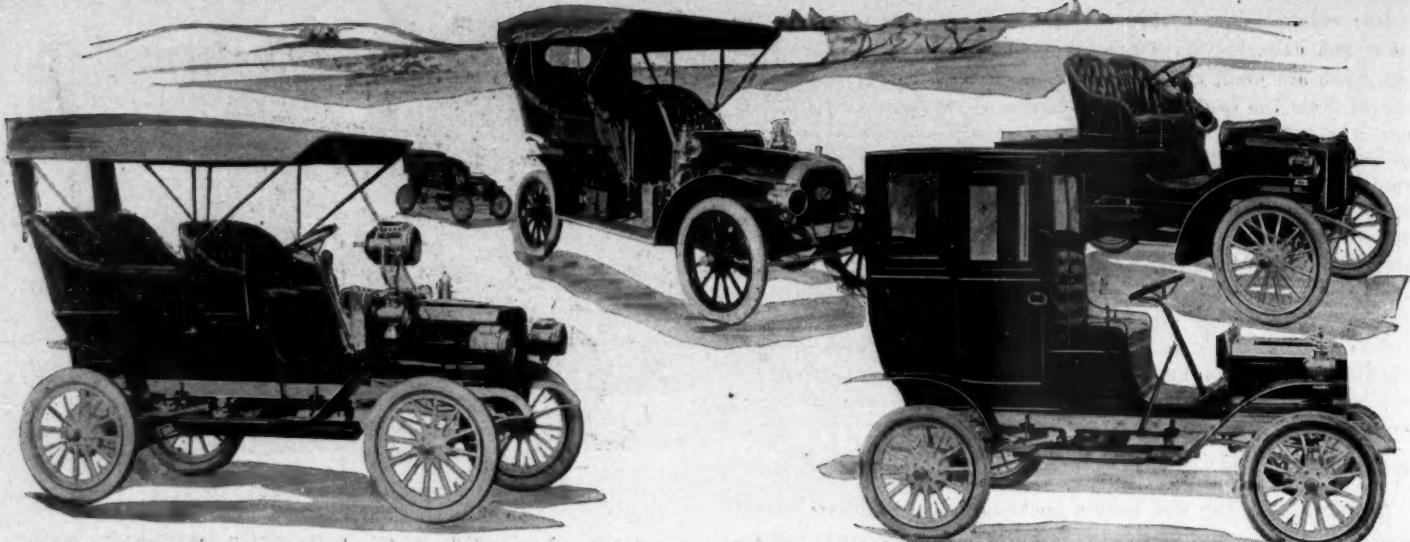
ing is by a 15-inch wheel carrying a stationary sector for the spark and throttle levers. All connections are provided with take-up for lost motion. The transmission brake is 6 inches in diameter and 2 inches wide, of bronze, with steel compression band. The emergency brake is operated by a side lever applying external brake bands to drums on both rear wheels. The transmission brake and cone clutch are operated by foot levers. Hoods are of the 1906 Mercedes type, with three brass hinges and turn-buckle fastener with butterfly nut. The hood fronts are the 1906 Mercedes type, full radiator front with brass band and brass molding at edges, side and front. Back of the hood front is a four-bladed fan, running on ball bearings. The guards are of laminated wood, connected by a rubber covered running board. Placed on left running board is a mahogany battery box containing a Witherbee storage battery of three cells, of 6 volts and 60 amperes, and four No. 7 dry cells in reserve. The body on all models is of wood, that on the runabout having individual front seats, semi-racing in design, with tapering rear platform box, and those on all other models having individual front seats and a tonneau seat for three persons. The finish of body, hood and guards is dark quaker green, with broad carmine striping, of running gear bright carmine, and of frame black. On the right hand running board is a mahogany box containing the outfit of tools. Several changes are noted in the transmission on the buckboard. It is of the friction type, with a large metal-faced disk on the front end of the crankshaft, which contacts with other disks. On a cross shaft a side chain drive is used. Other features on this type are numerous.

Reo Motor Car Co.—Reo

There is a new four-cylinder touring car shown by the Reo company in addition to the others—a five-passenger touring car, a doctor's rig, and limousine, all two-cylinder 16-horsepower cars; an 8-horsepower four-passenger runabout and one for two



CORBIN MODEL G CORBIN MODEL E



REO TOURING CAR

BABY REO

REO FOUR-CYLINDER

REO DEPOT WAGON

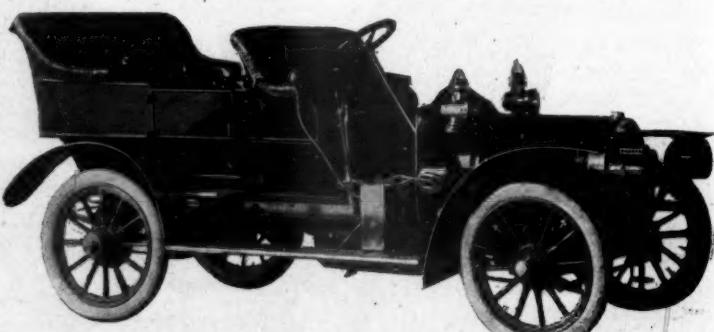
REO RUNABOUT

people, a ten-passenger bus and the Baby REO. The new car, without top, weighs 2,000 pounds and has a motor of the vertical twin-cylinder type, with the water space completely surrounding the cylinders. The bore is $4\frac{1}{4}$ inches and the stroke 5 inches, developing 24 horsepower at a speed of 1,000 revolutions per minute. Shields protect all gears. A six-feed positive mechanical oiler is fitted to the dash. The valves are interchangeable and are on the same side of the motor. The ignition is by high tension individual coils and the current supply comes from a 100-ampere storage battery of two coils on the running board of the chassis. Drive is by direct bevel gear and sliding transmission, three speeds ahead and a reverse being furnished. There is a multiple disk clutch which is composed of phosphor bronze and spring steel plates operating in oil. The transmission gear, running on ball bearings and with the gears made of hardened steel, wide faced and 6-pitch, is supported on the subframe in direct line with the motor. The brakes on the rear wheel are controlled by a locking side lever, which throws out the clutch before applying the brakes. The foot brake operating on the drum of the transmission shaft and clutch has an independent pedal. The steering is by screw and nut mechanism, the spark and throttle control being placed on top of the steering column and in a stationary position. Cooling is secured by a positive gear pump and honeycomb radiator with fan attached. The car has a wheelbase of 100 inches, 32 by 4-inch tires and semi-elliptic springs. The body is of wood and of the side-entrance, straight tonneau pattern, carrying five passengers. In addition to the four-cylinder machine, the REO people have something else new—a single-cylinder, convertible runabout, with a folding rear seat, which follows closely the lines of the two-cylinder models of 1905. The motor, located at the left-hand side of the frame, is of $4\frac{1}{4}$ -inch bore and 6-inch stroke and develops 8 horsepower. The valve chamber is directly beneath the footboard and the crankcase and change gear drum under the seat. The flywheel and transmission gear is carried on an extension from the crankshaft, which reaches entirely across the frame. The engine is hung from two cross members of the frame. In the REO carburetor, of the float feed, spraying type, the gasoline is admitted to the float chamber on top, a needle valve actuated by the float controlling its admission. The air passage around the spray nozzle and the supplementary air inlet is controlled by a double rotary valve which is located centrally within the mixing chamber. There is an adjustable needle valve in the spray nozzle. Jump spark ignition is used, the current coming from two sets of dry cells under the bonnet. A gear-driven pump driven directly from the engine crankshaft and a tubular radiator comprise the cooling system, while a large oil cup on top of the cylinder, feeding the crank chamber, lubricates the engine. The change speed gear is of the planetary, two-speed and reverse type, with no internal gears. The live

rear axle has roller bearings and the front one is tubular. Another one of the line is the depot wagon, 16 horsepower, with 90-inch wheelbase, two speeds and reverse and carrying three passengers besides the driver. For this 30 miles an hour is claimed. This coupé body is interchangeable with the regular touring car body. It is protected in winter by a glass front and windows, the driver being communicated with by a speaking tube, a feature of the miniature REO touring car.

Rainier Co.—Rainier

Although well satisfied with model A, a 22-28-horsepower car brought out last May, the Rainier people have made some alterations in model B, featured on the stand as the 1906 production. It is a 30-35-horsepower machine, built somewhat on A lines, but with an increase of power, a lengthening of wheel base to 104 inches and a make-and-break system of low tension ignition, with current supplied by a Simms-Bosch magneto. In model A a storage battery and coil were fitted. Stock parts are used largely in the construction of the Rainier. There is a vertical motor in front from which power transmission is through a cone clutch, sliding gear transmission and cardan shaft to the floating rear axle. The make-and-break ignition is, of course, the feature of the car. It has been the aim of the designer to provide ample hardened surface at any friction points where wear would interfere with the timing of the spark. On a boss at the right front corner of the crankshaft is the magneto, which is gear-driven from the inlet camshaft by enclosed gears. On the top of the cylinder heads, where it is easily accessible, is the entire mechanism of the make-and-break system. It has been customary in make-and-break systems to place the mechanical parts required to make the spark on the sides of the valve ports, and to operate them from pushrods the same as used for operating valves, but in the Rainier motor, instead of pushrods, a vertical rod which is revolved from the inlet camshaft through the medium of bevel gears, works the spark mechanism for each cylinder. Where the pushrod scheme is used timing of the



RAINIER FOUR-CYLINDER CAR

spark is frequently accomplished by the use of spiral cams on the camshaft and the entire shaft is moved endwise in varying the timing of the spark. This scheme is not used, however, in the Rainier, but rather a separate timing mechanism carried on the cylinder heads. The clutch is of the usual cone type, contained within the rim of the flywheel and connected through a universal joint with the change speed gearbox. Ease of engagement is assured through the use of a leather facing on the cone part. A Hill mechanical oiler provides lubrication to all of the crankshaft bearings. The pistons and wrist pins, however, are lubricated from the splash.

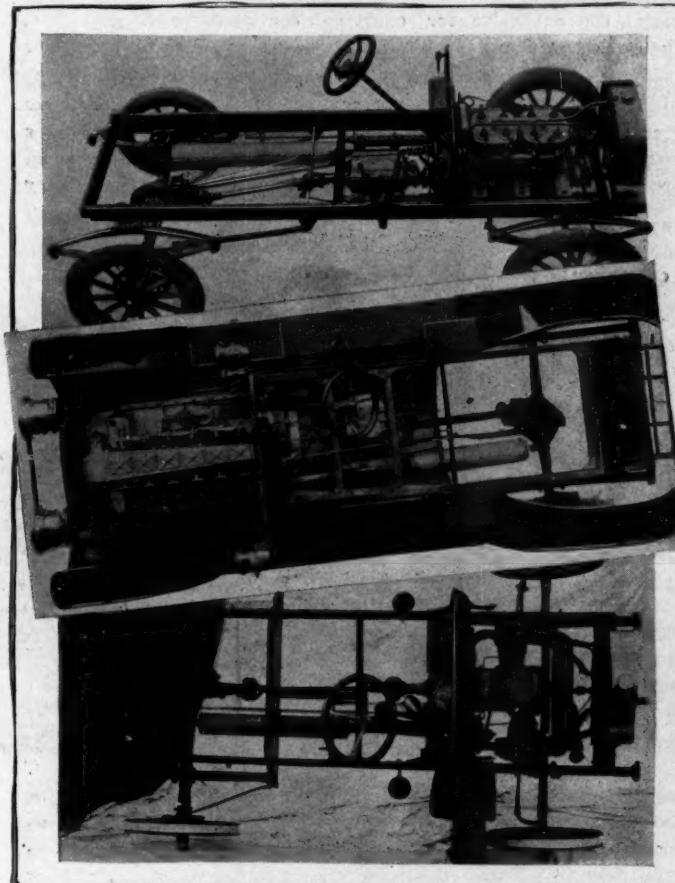
Buckeye Mfg. Co.—Lambert

No less than six different models of pleasure cars are displayed at the booth of this Hoosier concern and, as might be expected, all of them are driven through the patented Lambert friction type of transmission and thence to the rear wheels by double side chains. By this system of transmitting power, a friction clutch within the flywheel and a sliding, planetary or any other type of gear set is eliminated. Of the six models, 7 and 8 are fitted with vertical four-cylinder motors carried beneath a forward bonnet; three models, 4, 5 and 6, carry a pair of opposed cylinders placed crosswise in front beneath the bonnet, and the sixth, a runabout styled model A, has its power plant in the form of a pair of opposed cylinders carried crosswise of the car above the rear axle and the power transmitted through the friction wheels and disk and thence by side chains to the back wheels. The two four-cylinder models have the same motor and transmitting parts, the cylinders having a bore and stroke of $4\frac{1}{2}$ and 5 inches in each and both fitted with 98-inch wheel bases. Such differences as 34 by $4\frac{1}{2}$ -inch tires on model 8 and the same wheel diameter in model 7, but with the tires 4 inches in diameter, as well as the weight of the latter 2,000 pounds being a couple of hundred less than the other, are noticeable. In these models the motor is carried on a subframe, through a three point suspension, the back end carried by a cross girt of the main frame. Both models have on the rear end of the extended crank-shaft a large friction disk. In rear of this disk is a cross shaft carrying a sliding friction wheel, the periphery of which can be made to contact with the surface of the disk. When driving ahead the friction wheel contacts with the disk at one side of the disk's axle and in reversing on the opposite side. In controlling the wheels two control levers are required, one for sliding the friction wheel along its shaft to give different speeds and the other for bringing this same wheel into positive contact with the face of the friction disk. Of the three models 4, 5 and 6, with the motor carried crosswise in front, it can be said that the drive to the back wheels is identical with that in the four-cylinder machines except of course that the parts are not so heavy and strong. The motors of models 4 and 5 are the same, having a bore and stroke of 6 and 4 inches, and in model 6 these measurements are 6 and $4\frac{1}{2}$ inches. All three carry bodies of the side entrance type with detachable tonneau and have a range of weight running from 1,800 to 1,900 pounds. The runabout has a pair of 6 by 4-inch cylinders, the same practically as in the other opposed models, except that instead of the crank-shaft being continued to the rear its continuation is to the front, on which end it carries a large friction disk. In front of this disk is a cross shaft with chain connection to the road wheels. On this shaft is the sliding friction wheel whose periphery contacts with the face of the disk. The method of controlling speeds is identical with that in the other models only that the cross shaft is carried to the rear for positive drive instead of to the front.

Berkshire Automobile Co.—Berkshire

A 16-horsepower four-cylinder touring car, a 25-horsepower touring car and a 40-horsepower six-cylinder touring car are the three models ready for the coming season by this concern. The four-cylinder touring car has in its frame work a pair of channel steel side pieces that are offset alongside of the motor and in front and rear carry the usual spring hangers connected with

a set of four semi-elliptic springs. Both pairs of springs are swung beneath the frame pieces. In the motor are separately cast cylinders, each casting with a pair of ports, one on the left for the exhaust valves and another on the right for the intakes; and the motor carried on a pair of subframe pieces so that it is hung very low, the tops of the cylinders being on a level with the center of the radiator, are featured points. The intake piping from the carburetor, which is carried low at the right, resembles a T with the cross arms arched upwards and connecting to the top of low A pieces of piping for the front and rear pairs of cylinders. The throttle is placed midway of the vertical part of the T. Other points noted about the motor are half-time gears enclosed at the front of the crankcase, water pump carried on the left side of the motor and delivering its



CHASSIS OF IROQUOIS, FRAZER-MILLER AND MAXWELL

supply to the bottom of the cylinders at the left, and the exit is through the centers of the head to the top of the radiator, separate exhaust pipes coupling with a common pipe to the muffler, screw caps in the cylinder ports through which the valves are removed, cooling fan driven by round belt from the front end of the crankshaft and carried on a bracket from the front cylinder, and spark plugs carried above the intake valves. Transmission is through an internal cone clutch and sliding gear transmission with a differential enclosed in the rear of the case and thence by jackshaft and side chains to the rear wheels. In suspending the jackshaft from the frame side pieces large brackets, carried on the frame, support the shaft so that the bearings are beneath the chain sprocket, bringing the pull of the chain over the bearings, with the result that no binding comes on the shaft. In the rear wheels a similar mounting of the bearings is made. The gearbox is carried on the sub-frame. Two sets of brakes, internal emergencies working within hubs on the rear wheels and friction-band regular brakes working outside of the same drums, are fitted, the former applied by side lever and the latter pedal operated. A hollow metal dash is fitted, on which is carried the coil and a four-lead plunger oil pump. Control of the car is through a hand wheel with spark

and throttle levers, clutch and regular brake pedals and change speed and emergency brake levers. The car is a newcomer, only having been placed on the market for the 1906 trade.

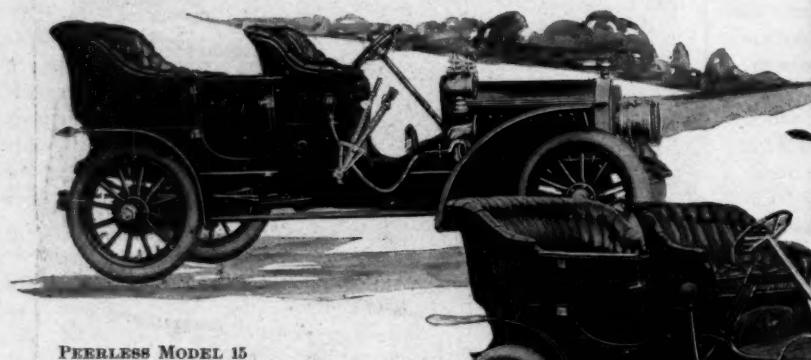
Peerless Motor Car Co.—Peerless.

Model 14, a 30-horsepower touring car carrying five passengers, and a 45-horsepower heavy touring car are the 1906 productions of the Peerless company. The new motor design is probably the most startling innovation attempted. A leather-faced expanding clutch is fitted, while Hess-Bright ball bearings are found in the rear axle, road wheels and gear box, as well as every other place except the motor. Then, too, a new horizontal tube radiator is prominent, as well as a new spring suspension. Several of last year's features have been retained, among them being the four forward speed gear box, with changes made on the selective system; the subframe for carrying the motor and gear box, arched rear axle and dished rear wheels. The main difference in the new motor is that instead of overhead valve levers of the walking beam type, the valves are placed in opposite ports on the right and left sides and operated by vertical pushrods from camshafts within the crankcase. The four cylinders are cast in pairs, with cylinders, jackets, heads and valve ports forming

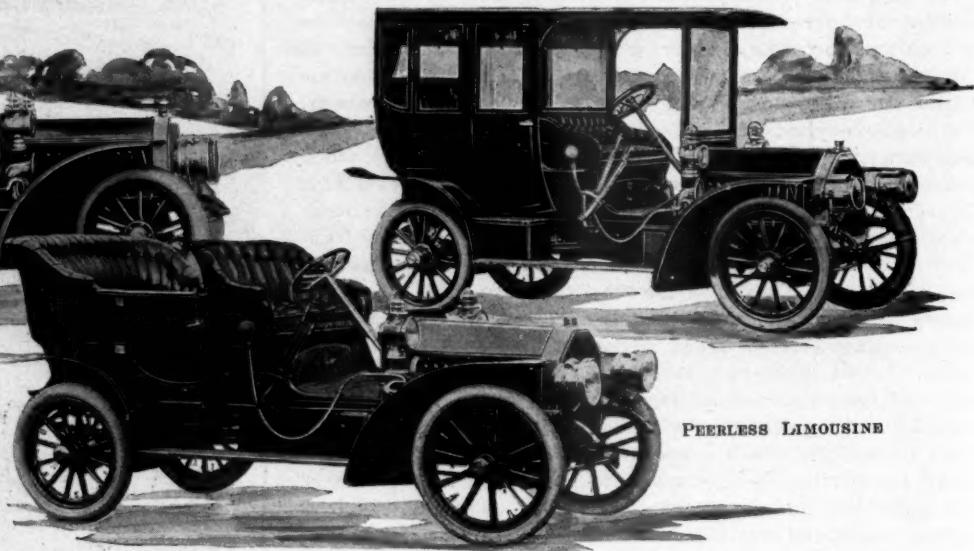
reverse idler in the base of the case which is mesh only when in use. The Peerless limousine exhibited is a stately creation, equipped with every modern convenience in the way of luxurious seats, speaking tube to driver, who is protected by a storm window. The rear seat is commodious and there is plenty of room in the passenger department.

Baker Motor Vehicle Co.—Baker Electric

Seven models of the Baker electric are found in the 1906 line, the line including the Baker Imperial, a chain-driven piano box runabout; a chain-driven stanhope for two persons, the Suburban shaft-driven two-passenger car, surrey which is shaft-driven and carries four persons, depot wagon, inside-driven brougham and outside-driven brougham. The Imperial weighs 950 pounds, has a wheel base of 68 inches and a 52-inch tread. Thirty-inch wheels are fitted with 3-inch tires. There is tubular running gear, all ball bearing. The runabout has a normal speed of 14 miles per hour and a maximum speed of 17 miles. It is built to travel 40 miles on one charge of the battery. The 1-horsepower motor is found under the seat and is direct geared through a rawhide pinion and steel gear to the countershaft which carries the sprocket. Chain drive to the rear wheels is



PEERLESS MODEL 15



PEERLESS LIMOUSINE

PEERLESS MODEL 14

integral castings. The crankcase is a three-part casting, with aluminum used throughout. The usual side inspection plates on the crankcase are not used. Oil grooves running in the bottom of the case to oil taps facilitate the draining of oil. An idler distributing the wear on the shaft gear is interposed between the crankshaft gear and the two camshaft gears. Thirty horsepower is generated in the smaller car, the crankshaft having a speed of 900 revolutions a minute, with the cylinders having a bore and stroke of $4\frac{1}{2}$ and 5 inches respectively. The crankshaft, a drop forging, runs on two end bearings and one between the cylinder pairs. White metal bushings are used, with the oiling from the splash. The flywheel is bolted to an integral flange on the rear end of the shaft and carries the clutch. The intakes and the exhausts are both located in the lower part of the ports and are removable. They are interchangeable throughout and have a diameter of 2 inches and a 5-16-inch lift. The push rod construction is standard. Around the mixing chamber is a water jacket and the carburetor is carried close to the cylinders at the right. A short Y piping connects each pair of cylinders, the throttle being controlled from the steering wheel and also from a governor carried on the inlet cam gear. The governor is of the standard centrifugal type, connecting with the throttle in the intake pipe. Instead of the cone clutch used in 1905, the new one is of the expanding type, the friction part being a leather-lined steel band expanded by a pair of coil springs. Five speeds are had—four ahead and one reverse, three sliding units being used—the first consisting of two gears which are made integral, the second of two gears bolted together and the third a

employed. The battery has twelve cells and the motor is a four-pole compound wound, with rocking brushes and is started through resistance. The controller is by three successive steps, with the batteries connected direct on the third position. Three full elliptic springs are used to suspend the body. Steering is by tiller. The stanhope is practically the same, with the exception of bed, body and appointments. The Suburban is a new model and is built along the lines of a gasoline car, having a $2\frac{1}{2}$ -horsepower motor mounted in front under the hood and using twenty-four cells of battery. It has a speed of 20 miles an hour and a mileage of 40 miles. The drive shaft is on a straight line fitted with a universal joint in the rear. The controller and steering are the same as on the other models. The surrey weighs, with cape top, 2,050 pounds, with a wheel base of 87 inches, with 36 by $4\frac{1}{2}$ -inch wheels front and rear. Motor, battery and mechanical arrangements do not differ from the others. The depot carriage weighs 2,450 pounds, has 93-inch wheel base and 36 by $4\frac{1}{2}$ -inch wheels. The inside drive brougham has the same power equipment as the surrey and depot wagon, with 84-inch wheel base and 36 by $3\frac{1}{2}$ -inch wheels in front and 36 by $4\frac{1}{2}$ -inch in the rear. The outside drive brougham has more power, being equipped with a $3\frac{1}{2}$ -horsepower motor, with the driver's seat in the rear. It weighs 2,800 pounds.

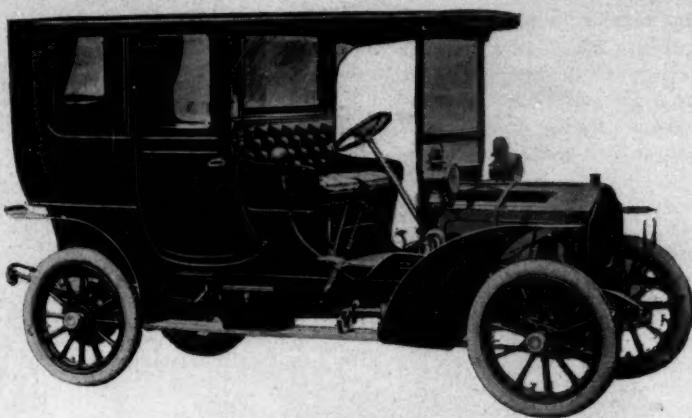
Joseph W. Moon Co.—Moon

The Moon made its debut in the shape of a four-cylinder vertical 30-35-horsepower car in which are found several parts

of strictly Moon design, notably the transmission, clutch, radiator and hood. The cylinders and pistons are accurately ground to size and the valves are interchangeable. The steel crankshaft is forged in one piece, the bushings being of bronze with babbitt metal for the crankshaft bearings. The upper and lower crank cases are of aluminum alloy. The commutator is found on a vertical shaft driven by bevel gear at the rear of the engine. The sliding gear transmission, giving three speeds forward and a reverse, has a shaft of forged steel mounted in nickel bronze bearings. Direct drive is had on the high speed. There is a universal joint connecting engine and transmission. The clutch is of the multiple disk type with the disks covered with leather instead of being of the usual metal variety. The driving clutch plates are $1\frac{1}{2}$ inches larger than the driven one and are kept from revolving independent of the crankshaft by two driving dogs $\frac{3}{4}$ by 1 inch, which are a running fit in slots cut at the outer edge of the plates. Keyed to a sleeve running to the end of the crankshaft are the plates that are constant with the transmission. The plates are forced together by two cams actuated by stiff helical springs and can only be released by operating the pedal. Engine and transmission are mounted on a pressed steel subframe. There is a tubular type of live rear axle running on ball bearings. The hub brakes are of the internal band type covered with woven fiber. The frame is of cold pressed carbon steel of the channel type, with the spring hanger studs made of a special drop forging. The cellular type of radiator is supported by a $\frac{3}{8}$ by 4-inch piece of flat steel running from one side of the frame to the other. There is also a cast brass side bracket, but this is not used in the support. The engine can be reached from either side, the hood being of the three-jointed type. A wood body is fitted, there being a double side entrance, the doors being 21 inches wide, with a rear seat capable of providing for three large passengers.

Decauville Automobile Co.—Decauville

Features of the five models of Decauvilles shown are the steel pan which supports the engine and gear case, which is attached directly to the pressed steel frame; four cylinders placed vertically in pairs under the hood, all valves being mechanically operated and placed on opposite sides; honeycomb radiator fitted with a fan; circulation by means of a gear-driven pump; all gears enclosed in oil baths; oiling automatically governed through a sight feed lubricator; two sets of double action brakes, expanding in the rear hubs for one set and the other set contracting hand brakes on the drive shaft; all control valves on the steering wheel. Single-track ball bearings are used on all journals, except the crankshaft, on all but the smaller models. Two complete ignition systems—high tension magneto and batteries—are fitted to all but the little fellows. The Decauville carburetor is automatically controlled by the speed of the engine and fed by pressure from the gasoline tank. Sliding gear transmission and shaft drive are fitted to all the models. The tread is the American standard. The 12-16-horsepower model has cylinders with $3\frac{1}{2}$ -inch bore and 4-inch stroke, with three speeds and reverse with direct drive on top speed. Jump spark ignition, with battery



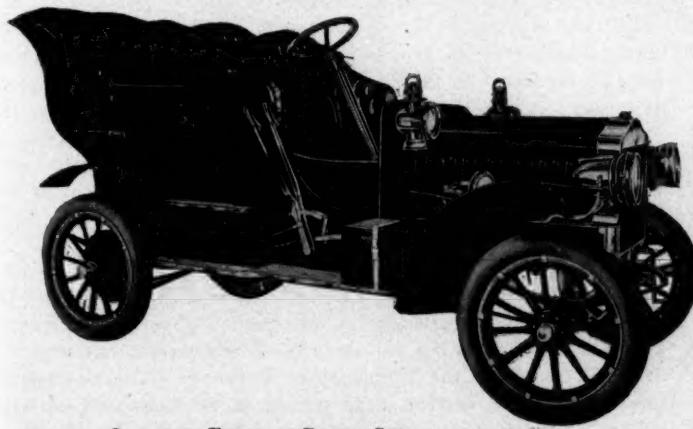
NEW PACKARD 24 LIMOUSINE

from current, is the equipment. The body length on the chassis is 95 inches and the tread 56 inches. The 16-20-horsepower model has cylinders with $4\times 4\frac{1}{2}$ bore and stroke, with the wheel base from 106 to 110 inches. The body length on the chassis is from 97 to 103 inches. The 24-28-horsepower model has four speeds, and one reverse with direct drive on top speed. The wheel base is the same as on the preceding model. On the 30-35-horsepower car the main difference is in the size of the tires. The 45-60-horsepower has sliding gear transmission and side chain drive and a wheel base of from 115 to 125 inches, and developing a speed of from 50 to 60 miles an hour.

Archer & Co.—Le Leon and Hotchkiss

On the 35-horsepower chassis of this French car can be fitted a semi-racing, side-entrance, limousine or coupé body, and Archer & Co. show these styles. A four-cylinder upright motor with $4\frac{1}{8}$ -inch bore and $5\frac{1}{2}$ -inch stroke is used. The cylinders are cast separately, both valves are mechanically operated and provided with a regulating valve controlled by an automatic governor as well as by the driver. The crankcase is of aluminum, the upper half being removable. The nickel steel crankshaft has five bearings and is lined with Montefiore bronze. There is a camshaft on each side of the motor which can be removed by unscrewing three nuts. The lift on each valve can be regulated independently. Oil pipes run to each individual bearing. The cone clutch is fitted with ball bearings and there are three speeds forward and reverse, with direct drive on the high speed. All through the gearbox there are ball bearings, the gears themselves being cut from solid blocks of compressed chrome steel. There is an interlocking device, operating automatically, which prevents the gears being thrown in half way. In order to pass from one speed to the next it is only necessary to start the lever, it falling into proper position of its own accord. The bevel gear and differential are not in the speed gearbox, being independent and connected by means of a universal shaft. The sprocket driving shaft is suspended from the frame by two universal joints, increasing the flexibility of the chassis on rough roads. These parts are independent of one another and are connected by flexible universal shafts. Ignition is by jump spark with current from storage battery and coils. The steering gear is irreversible and adjustable, the radiator of the honeycomb pattern and with forced draft and the oiler mechanical with a positive drive. With the exception of the main crankshaft ball bearings are used throughout. The mechanical oiler is directly attached to the motor by a system of levers instead of by belt or rope.

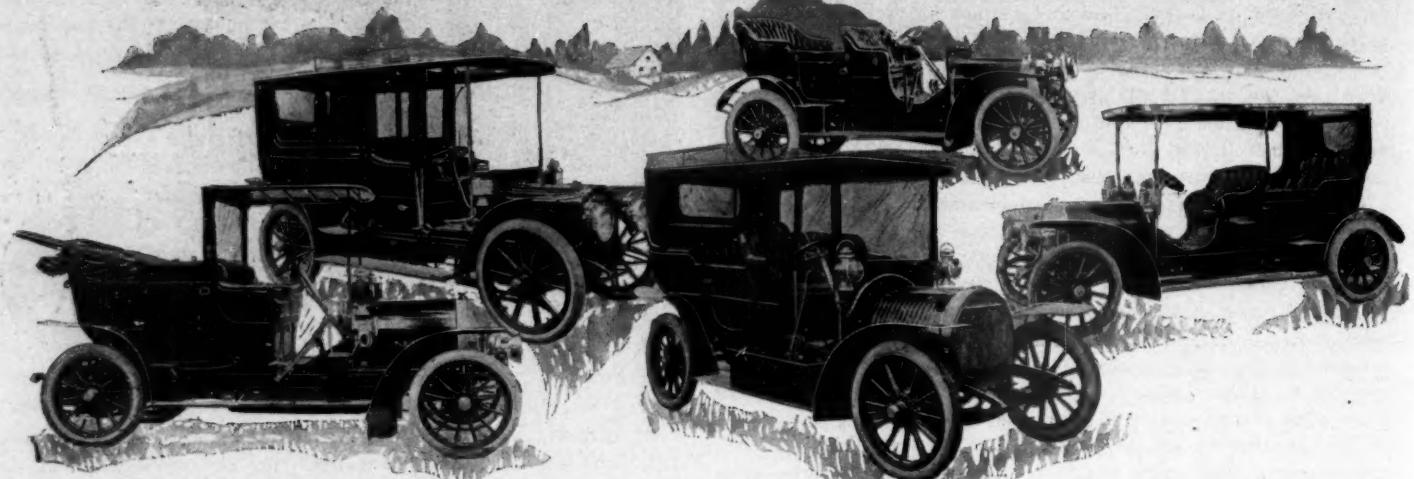
Features of the Hotchkiss are a four-cylinder upright motor, a pressed steel nickel frame, mechanically operated valves, honeycomb radiator, four speeds and a reverse, and direct drive on high speed. Shaft drive is fitted, a double universal joint being used and the usual strain rod dispensed with. The rear axle is formed of a double set of steel tubing, with the differential gear encased in a steel box which has its joint placed horizontally, allowing of the removal of the upper part for the purpose of inspecting, cleaning or oiling. Inside this hollow axle



LAMBERT FRICTION-DRIVE CAR

MORS

BERLIET 25-30



DE DIETRICH

HOTCHKISS

BERLIET 35-40

is the driving shaft, so the axle has only to stand the driving strain, having nothing whatever to do with carrying the load. The differential and the driving bevel gear axle are supported at both ends in ball bearings, the driving axle also being connected to the gearbox by a shaft with universal joints provided with a double crescent sliding in grooves on the driving shaft. This construction allows of a free movement of the shaft in any and all directions and adjusts itself to all strains. The speed gear is of the new racing type with double sliding gears. The clutch is of the cone variety, leather-covered, and having a universal joint which allows it to remain always truly centered. While it is possible to pass directly from one speed to another without going through the intermediate speeds, it can only pass to the reverse by moving a special locking device. The cylinders on the motor are cast in pairs and the crankshaft, in an aluminum case, has five bearings, all ball bearings. Magneto ignition, either high or low tension, is used. Automatic lubrication of the motor is furnished by a mechanical oiler on the dash while the speed gear and differential run in oil.

English Daimler Co.—Daimler

Three types of chassis are offered by the concern which English royalty patronizes—a 28-36, a 30-40 and a 35-45-horsepower models. The first has a 104-inch wheel base, 51-inch tread and weighs 2,000 pounds; the second has 120-inch wheel base, 51-inch tread and weighs 2,200 pounds, and the third a 132-inch wheel base, a 55½-inch tread and weighs 2,250 pounds. In the frame straight steel plates combined with wood and channel steel are used. There is no underframe, the frame being narrowed in front. The axles are of new design of straight steel. The front one is of forged H-section with forked swivels, and the rear of bar steel, shaped to H section. The hubs are steel stampings fitted with ball bearings. Extra long, grasshopper type springs are used, the rear ones being fitted outside the frame. Four cylinders are found in the motor. They are cast in pairs, with large waterjackets. The mechanically operated valves are placed on one side and are mounted on an angle, the valve mechanism being exposed for the sake of accessibility. Combined with the carburetor, which is of new Daimler design, is a graduated throttle actuated by hand control. The high tension ignition system employs only one coil and trembler and one low tension timing brush. The distribution of the current is effected in the high tension circuit. In the engine control a single lever placed above but independent from the steering wheel operates the throttle and ignition. The Daimler radiator consists of an aluminum tank at the top and a copper tank at the bottom, connected by light grained vertical tubes. Behind the radiator is an aluminum fan. The radiator, pump and engine waterjackets, which are located closely together and connected by short and direct pipes, compose the cooling medium. There is a three-sight feed lubricator to cylinders and crankcase.

The other bearings are self-lubricating. The clutch is an aluminum cone covered with leather and controlled by a foot pedal. In the gear case are found four speeds and a reverse. In the speed change control each change is effected by one stroke of the lever. There is a separate lever for the reverse. On the lowest powered car there are two external band brakes on steel drums, mounted on each end of the cross shaft and operated by a foot pedal. On the other the brake acts on steel drums.

Viqueot Co.—Viqueot

Although the Viqueot is made in France, American capital is interested in its manufacture. The concern is showing two models, one of them, a 40-45-horsepower machine, being new. The old one is a 28-32. Except as to size there is no difference between the two cars. There is a four-cylinder motor, with the cylinders independently cast. The valves are placed on opposite sides and are interchangeable. They are mechanically actuated by separate camshafts, which are driven from a noiseless fiber pinion meshing directly with the cam gears at the forward end of the motor. An aluminum housing supported by studs extending from the crank casing partially enclose the motor. The camshafts and cams are located in separate chambers at the side of the crankcase. The covers of the camshaft chambers carry push rod guides which are actuated by cam rollers. There is no subframe and the upper half of the crankcase is cast with heavy arms of H section, the ends of which lie in the channels of the main frame. The float feed carburetor has a waterjacket connected to the cylinder jacket circulation, but which is controlled by a valve. The throttle is of the sliding type. Jump spark ignition is used. The car can be started from the seat, the distributor for this system being located on a vertical shaft driven from the after-end of the inlet camshaft. The oil reservoir for the lubricating system feeds by gravity, three of the copper tubes running to the crankshaft and two to the camshaft bearings. The feed to the main bearings cares for the crank pin bearings. The oil is raised from the bottom of the crank chamber to the reservoir again by a plunger pump driven from an eccentric on the exhaust camshaft. This pump develops a pressure in the reservoir and aids in the feeding should the gravity not prove sufficient. There is a sliding pinion type of change speed gear controlled by a single lever. Double side chain drive is employed. The wheel base on the big car is 112 inches.

Mors Automobile Co.—Mors

A 12-horsepower landaulet, a 19-horsepower double phaeton, a 19-horsepower traveling Berline, a 30-horsepower double phaeton, a 40-52-horsepower touring car and a 24-32-horsepower limousine are in the line made in the Mors factory in France. The motor is of the four-cylinder vertical type placed in front and fitted with mechanically-lifted inlet valves, the inlet and exhaust valves

being interchangeable. The automatic carburetor has one central jet with a constant level of gasoline and a fixed air inlet. There is also an inlet for additional air by means of a valve. The ignition is the make-and-break spark system, current being furnished by a low tension gear-driven magneto. A single wire distributes the current to the cylinders. Power is transmitted to the gearbox by a driving shaft fitted with flexible joints. The transmission is from the differential shaft to the wheels by means of two single-roller chains. The frame of the Mors car is of pressed steel, supported on four road wheels by long springs. The brakes are enclosed in drums and are of the expanding type and covered in from all dirt, dust and mud. The gearbox is suspended in the frame. It contains four speeds and a reverse gear, all actuated by one lever. Ballbearings are used throughout the machine except on the crankshaft. The lubrication of the engine is secured by an automatic oiler. The control of the throttle is arranged from the steering wheel by a ratchet, and also by a pedal. In connection with the throttle it should be mentioned that the mere act of throwing out the clutch shuts down the throttle and prevents the engine from racing, no matter where the throttle may be set by the lever on the steering wheel, thus enabling the driver to have control over his machine at all times. The universal joint between the gear box and the fly-wheel secures alignment of all bearings, both of the gearbox and engine. The clutch is of the Mors type.

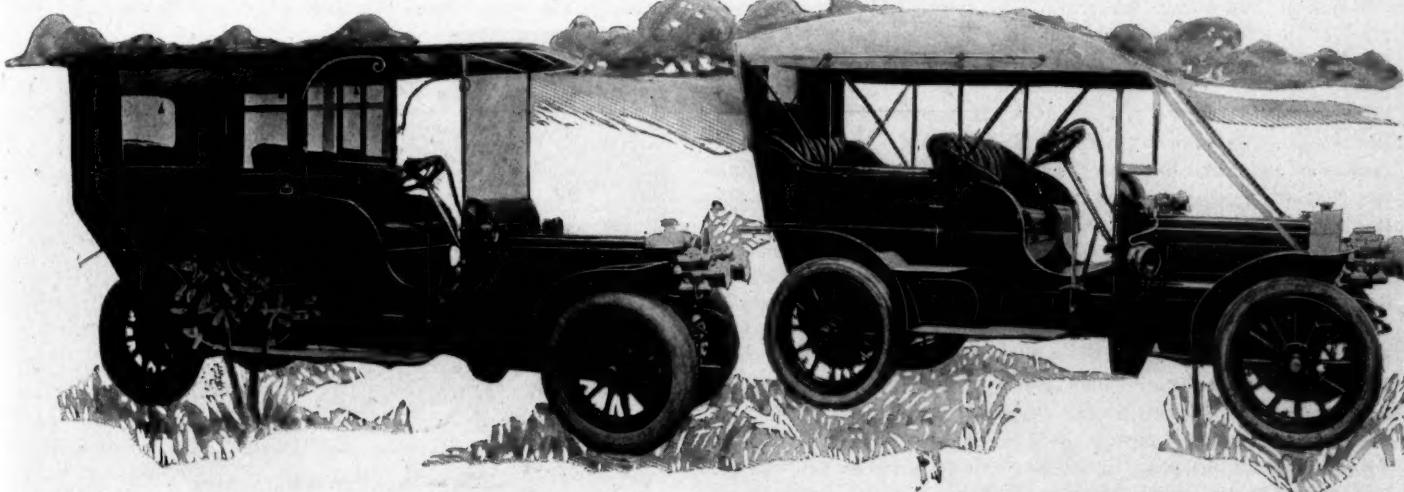
Palmer & Christie—Martini

With the Martini in but two sizes, a 20-24 horsepower, showing about 28 brake horsepower, and a 30-40 horsepower, showing about 48 brake horsepower, there is displayed a touring car and a chassis in each size. The engine is made up of four cylinders cast in parts with all eight valves mechanically operated. Ignition is by make-and-break, low tension magneto and controlled by a lever extending up and back from the dashboard. This lever operates a flat bar with cam slots that govern the moment of ignition. The carburetor is automatic in ratio to the engine speed and is connected to the clutch pedal. Gasoline feed is by pressure. Water circulation is by gear driven pump and Mercedes type honeycomb radiator, with ventilating fan. Lubrication is automatic through a sight feed lubricator on the dash. Camshafts and other parts are enclosed, running in oil. The clutch is metal-to-metal, with connection to carburetor to prevent racing when changing speed. Transmission is by sliding gears, having four forward and a reverse with the hand lever working through a gate quadrant and selective slide rods at the bottom of the case. The direct drive is on the fourth speed. The emergency brakes expand in the rear hubs with the equalizer as a flat bar extending entirely across the frame. The foot brakes are water-cooled and a gasoline cut-off acts as a natural brake. The drive is by slide chains kept well back. The usual pressed steel frame sides are carried well back and are connected by a looped cross member resting on a platform spring. This gives a quintuple suspension for smooth running.

The under part of the frame is enclosed, protecting all mechanism. The throttle lever is on top of the steering wheel. All steering parts are placed back of the front axle for protection. A special feature is an extra pedal for checking speed in traffic, leaving both hands free for steering and signaling. Chassis length on the 20-24-horsepower model is for bodies up to 95 inches and on the 30-40-horsepower up to 103 inches.

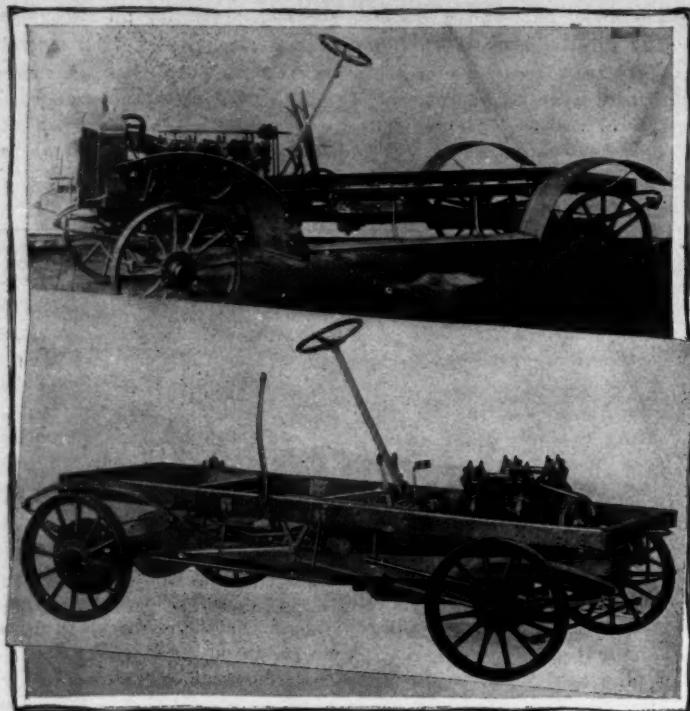
E. B. Gallaher—Brasier

The first point that strikes the interested as they come to this exhibit is that the cars are now known as the Brasier, the prefix Richard having been dropped. The exhibit is made up of a 50 to 60-horsepower chassis with a Rothschild limousine, a 25-36-horsepower chassis with Flandrau Tulip double phaeton and a 25-36-horsepower polished chassis. The horse-power rating has been lowered owing to the increase of taxes in Paris on the rating of cars; the 25 becoming 15-20, the 40 a 25-36 and the 75 a 40-60. The motors have changed in some respects from 1905. Both groups of valves are on one side and are operated from one camshaft. The magneto is on the side opposite the exhaust and is free and clear in its surroundings. The magneto gear is fastened to the magneto shaft without auxiliary bearings to get out of line. One bolt with a thumbscrew makes taking off and putting back a thing of short moment when cleaning or examination is resorted to. The wire from the magneto runs to a plug switch on the back side of the dash and is from there distributed by plug switches to the steering wheel with a cut-out switch and to a bus bar on the motor. Should a short circuit be found in the steering wheel line, it is only necessary to shift the plug on the dash to make a direct connection from the magneto to the motor and thus cut out all auxiliary wiring. While the same form of oiler is retained, its details are quite new because in France it is a penal offense to have a smoky exhaust. By throwing over a small lever the oil is cut down to such a point that it will not smoke. Moving the lever back gives the full supply of oil required when running the motor at its complete power. The same dust-laying device is used this year as last. The Truffault suspension is also continued as a regular fitting. The governing of the motor is entirely changed. The butterfly valves are removed from the cylinders and in their place a piston valve is put in the carburetor. The carburetor has an automatic air intake that permits running the motor for any length of time down to 150 revolutions per minute. By moving the accelerator maximum speed is given in quick progression and back to low speed can be had at once with steady running all up and down the scale. Another device which is absolutely new and which will be appreciable only to the 15-20-horsepower car is an auxiliary gear box bolted to the frame and which is attached with about an hour's work. This gives eight speeds and is thrown in and out of service by a small lever on the side of the car, with nothing moving in the gear box but a straight through shaft. The purpose of this auxiliary gear box is



ENGLISH DAIMLER ROYAL LIMOUSINE

ENGLISH DAIMLER CAPE TOP



CHASSIS OF YORK AND MARMON CARS

to divide in half all four speeds. In other words, if the car is running at 50 miles an hour in fourth speed, the throwing of the small lever cuts the speed down to 25 miles an hour without moving throttle, spark or clutch, and, obviously, all other straight gear combinations and road speeds are equally susceptible to splitting. By throwing the lever back again there are the original four gears just as we ordinarily know them. This extra gear box will be sold at an additional price. Its application or removal can be made without in any way changing the efficiency of the car. All models are selective in two lengths of chassis and all springs have been lengthened, widened and strengthened. The 20-horsepower car is the only bevel-gear driven car to be sold this year, the 36 and 60-horsepower cars being both chain-driven.

Gallia Electric Carriage Co.—Gallia

Electric rigs in two styles—the Gallia and the Galliette—are shown, the product of the factory of the Societe l'Electrique of Paris. The chassis of the Gallia is constructed of steel plate and Z-angle iron, connected by cross braces. As it allows of the use of interchangeable bodies, models are shown in varied styles. The feature of the car is its easy steering and the ability to turn in a short radius, caused by the rear wheels being the drivers, which gives a greater turn to the front wheels. There is no differential, the wheels being actuated directly by the compound type of motors, which are completely enclosed and yet easily accessible. The motors oscillate around a horizontal axis and a pinion, carried by the shaft, meshes directly with the circular rack on the inner face of the wheel. It is possible to pass from one speed to another without jerking or burning the contacts by reason of the controller being wide enough in diameter to allow the contacts to have sufficient surface and be placed some distance from each other. Six speeds and two positions of breakage and recuperation are secured through the controller, which is managed by a lever under the hand wheel. The accumulators, of the Ajapa type, are of the pasted oxide style and have capacities varying from 140 to 250 ampere hours. There is a special starter which is worked through a pedal operated by the left foot. There are five brakes. The speed normally is from $2\frac{1}{2}$ to 19 miles an hour. The Galliette, designed for the use of novices particularly, is easily handled and is provided with a battery of Ajapa accumulators good for from 55 to 62 miles on one charge. This model has a chassis made of U-iron, the four wheels being of uniform size. There is a single motor placed beneath the

chassis which controls the rear wheels by means of a cardan transmission. There are two speeds forward and a reverse. Change of speed is obtained through a lever, but intermediate speeds, from zero to 15 miles, are secured by pedal. The lever is designed mainly for safety purposes. The motor is excited in series and has an armature provided with a Siemens short winding. The accumulators are in two boxes, one under the hood and the other under the front seat and are of the same type as is found on the Gallia.

Panhard & Levassor—Panhard

Five cars comprise this exhibit. A 24-horsepower limousine, accommodating four passengers; a 24-horsepower limousine of similar design, but carrying six passengers; a 15-horsepower limousine for four passengers, and using three-quarter elliptic springs in the rear; a 35-horsepower touring car, and a 50-horsepower touring car. In all of these the new design of Panhard chassis is not used, although many of the 1906 specialties are found. The real Panhard chassis reveals the innovations introduced by this pioneer concern. Noteworthy among these is the use of a new carburetor, which has the mixing chamber water-jacketed, and in which automatic control of the mixture is by a water governor similar to that used on Packard and Napier cars. Further control of the throttle is from the revolving finger wheel on the steering wheel, and by an accelerator pedal. Next to the carburetor must be noted the multiple disk clutch—a type of clutch not yet much followed by continental builders. In the clutch are fifty small disks, the diameter being sufficiently small to allow of the flywheel spokes serving in the capacity of a fan for aiding in motor cooling. These disks are in two sets of twenty-five each, one set secured by bolts at their outer edges to the flywheel, and the other set connected at their inner edges to the shaft to the garcas. In taking the drive from the clutch to the gear box a long shaft is required, as the gearbox is near the back axle and the side chains are very short. In order that the clutch can be removed without dismounting either the motor or gearbox, a three-piece propeller shaft connects the clutch and gear set. The center part of this is made with large end flanges, which bolt to similar flanges on the respective ends of the shaft from the clutch, and that to the gearbox. By removing these bolts the center part of the shaft drops out of position and the clutch can be disassembled. The use of such length of shaft between gearbox and clutch calls for a special bearing for the shaft, which is carried on the bottom of a frame cross piece. The bearings resemble the sliding block type and care for slight misalignments. The gearbox contains a sliding set, giving four forward and one reverse speeds, all of which are gained through the medium of one side lever. Keeping apace with the most accepted rules in car design is the use of ball bearings in all parts of this case. Similar bearings are adopted not only in the jackshaft, but also in all of the road wheels. In lubricating the motor, a regulation Panhard oiler decorates the dash. From this passes one lead to the differential



THREE OF THE GALLIA ELECTRIC LINE

gear case, carried in the rear of the gear box; another passes through the dash and divides into branches, one going to each crankshaft bearing. Still another leads to the motor and, branching, sends one branch to each cylinder wall. A combined steel and wood main frame remains in vogue with this concern, as does a subframe for carrying the motor and the suspension of the gearcase beneath a pair of main frame cross pieces. A horizontal tube type of radiator, with combined water tank, is fitted. The water pump is carried on a gear-driven shaft, as is the magneto for high tension ignition.

Acme Motor Car Co.—Acme

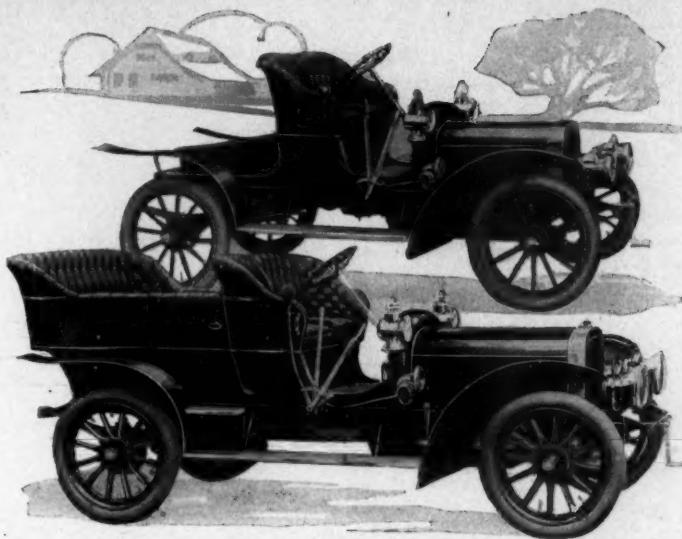
There are shown a landaulet and a polished chassis, both with 45-50-horsepower motors, a landaulet and a touring car with 30-35-horsepower motors. All motors are cast with separate cylinders. In the 45-50 horsepower the intake and exhaust are on opposite sides and mechanically operated, while in the 30-35 horsepower the inlets are of the atmospheric type. In the larger size the drive is through a multiple disk clutch, a four-speed and reverse selective transmission with side lever working through a gate quadrant, and final drive by side chains, with differential in the transmission case. Water circulation is by gear-driven centrifugal pump and horizontal, gilled, tubular radiator. Ignition is by jump spark and storage battery. The foot brake operates band brakes on the jackshaft and, the side lever expanding brakes in the rear hubs. Ratchet and pawl sprays are fitted to the rear hubs with a finger piece pull-out on the front seat apron. Lubrication is by force feed through a Hill precision oiler. The spark and throttle sectors are on top of the steering wheel. In the 30-35 horsepower the detail features differing from 40-45 horsepower, other than those mentioned, are a cone clutch and a three-speed and reverse transmission operated by the hand lever passing over a notched quadrant. The general lines of the car are slightly altered.

Norris N. Mason—Bolleo

The Bolleo car is represented by a limousine, a double phaeton, a three-fourths landaulet and a 40-horsepower polished chassis. The motor has its four cylinders cast in pairs, with mechanically operated valves placed on both sides, with all valves interchangeable. Ignition is by two distinct systems—a storage battery and jump spark, and a Simms-Bosch magneto. Cooling is by a volume pump and honeycomb radiator, with an automatic filter. The transmission is by sliding gear, of heavy construction, with four speeds and reverse, operated through a gate quadrant and final drive by side chains. The clutch, of the cone type, leather-faced, is suspended on three points and when in contact with the fly wheel takes up any non-alignment between motor and transmission case they are mounted on a three-point suspension, allowing them to float independently of the main frame. The emergency brakes expand in the rear wheel chain drums and the pedal brake, acting on the differential shaft, is of the double band type.

American Peugeot Automobile Co.—Peugeot

The polished chassis, direct from the Paris show, with a 30-40-horsepower motor, almost overshadows the 18-24-horsepower and the 30-40-horsepower touring cars. The engine, of the usual four-cylinder type, has its cylinders cast in Paris, with mechanical valves on each side. Ignition is by Simms-Bosch magneto and by jump spark, with storage battery. There is also an automatic exhaust lift in connection with the starting crank, to give half compression for starting. The exhaust from the valve chamber is into an oblong-shaped brass casting that has the appearance of having one large chamber. In reality there is a cross partition dividing it into an upper and lower chamber. Into the upper chamber cylinders 1 and 3 exhaust and into the lower cylinders 4 and 2, with a final lead of two pipes to the muffler. Water circulation is by centrifugal pump and honeycomb radiator. Drive is through a cone clutch, four speeds and reverse sliding transmission, a cross shaft and side chains. The four speeds are operated by a side lever working through a gate valve



HAYNES RUNABOUT AND TOURING CAR

and selective rods enclosed in the transmission case, keeping them from being effected by outside dirt, etc. There are three larger foot pedals, mounted on one shaft, and pushing forward, with long leverage. The right hand pedal operates the expanding brakes in the rear wheels, through an ample size equalizer bar extending entirely across the car, and of the locomotive type. The center pedal operates the cone clutch. The left hand pedal expands the brake shoe on the drive shaft, back of the transmission, and running to the crankshaft, which is set well back, giving very short chains. The hand lever at the side of the car expands a brake shoe in a drum on the cross shaft, which drum has a rack on its outer periphery for a dog to act as a spray in hill climbing. The steering column is pivoted to the side frame members to allow for considerable change in the rake, to suit the individual driver. Both axles are of I-beam section and it is noticed that the shock absorbers are connected directly to them, instead of to a plate held in place by the spring bolts. Those on the front axle are outside the frame and those in the rear are placed inside.

Renault Brothers—Renault

The Renault cars are shown in a 10-14-horsepower town car, with landaulet body; a 20-30-horsepower polished chassis; a 14-20-horsepower three-fourths limousine, and a 40-50-horsepower chassis. There is also shown a 40-50-horsepower motor, mounted for marine use. The engines are of the four-cylinder vertical type, cast in parts, with mechanical valves all on one side. Ignition is by Simms-Bosch high tension magneto, direct driven from the motor. Cooling is by the thermo-siphon system, with the radiator at the dash, and air circulation by a fan on the fly-wheel rim. Lubrication is by forced feed to all journals, with splash oiling for the cylinders. Only the gas throttle is operated from the steering column, as the sparking point is set. Drive is through an internal cone, sliding gears with four speeds and reverse and final drive by shaft to rear axle. Braking is by foot pedal and expanding ring on drive shaft, and by hand lever to expanding rings in rear hubs.

Sidney B. Bowman Automobile Co.—Clement-Bayard

An entirely new model is shown in the 60-horsepower chassis that is notable because of the light car rule which has heretofore held with the Clement-Bayard. In addition there is shown a 24-horsepower chassis, a 30-horsepower brougham and a 45-horsepower road racer. The three larger powered cars are chain driven and the 24-horsepower shaft driven. Other than the obvious change from these conditions and larger bores and strokes all models are of the same general detail. Little change is found from last year with the important exception that the clutch is now of the disk type. Motors are cast separately and valves are mechanically operated on opposite sides of the motor, all interchangeable in themselves and their fittings, with the intakes on the right side,



C. G. V., PEUGEOT AND DE DIETRICH

as is also the Simms-Bosch magneto. Water circulation is by chain-driven pump, with piping all of a size, the leads from the cylinder head being through brass cap plates held on their seats by screws. Bolted to the crankcase and at its rear end is an index finger, which reaches just over the forward edges of the flywheel. On the latter is marked the seatings for all valves, making it a simple proposition to retime any or all cylinders should they be dismounted for any purpose. The radiator is of cellular type of closer mesh and greater fore and aft depth with ventilating fan. Change speed is through a sliding gear transmission with four forward and reverse, all on one lever, expanding in the hubs and on the drive shaft. On the drum of the drive shaft is cut a series of teeth for a dog acting to hold the car from backing down hill and operated by a finger grip placed on the front seat apron. The rear hub brakes work through an equalizer at the back end of the lever shaft rod. The frame sides at their rear are looped up to increase the clearance over the rear axle, the center of gravity of the power plant being kept well down below the top line of the frame. The engine and gearcase are carried on a subframe, the side members of which are cambered after passing forward of the flywheel. On all models the front axle is of I-beam section, with ample seatings for the springs. Bodies regularly supplied are five-seated king of the Belgians side entrance. Optional bodies are, of course, supplied as well as only the chassis.

Auto Import Co.—Rochet-Schneider

Three cars, an 18-22 with shaft drive, a 30-35 with chain drive and a chain-driven 40-50, are the leading models sold by this concern. Rochet-Schneider motors are regularly of the vertical four-cylinder type with cylinders cast in pairs and having valves disposed in ports on opposite sides. All valves are interchangeable, low-tension make-and-break ignition is used, and clutches of the expanding class operating within the flywheel are fitted. The transmission is through four forward speeds and a reverse and cross shaft with side chains to the rear wheels. The shaft on the main transmission is supported on ball bearings. The brakes are in two sets both double acting, metal-to-metal on the differential and metal-to-metal expanding in drums on the rear wheels. There are three pedals, one for the clutch, one for the ordinary brake on the cross shaft and the third also working on the cross shaft and interconnecting with the clutch. The water radiator is of the honeycomb type, cooled by a fan at its back and one in the flywheel. The springs

are semi-elliptic front and back, the rear being a three-spring suspension, the cross spring attaching to a yoke extending from the rear frame member.

Charron, Girardot & Voigt—C. G. V.

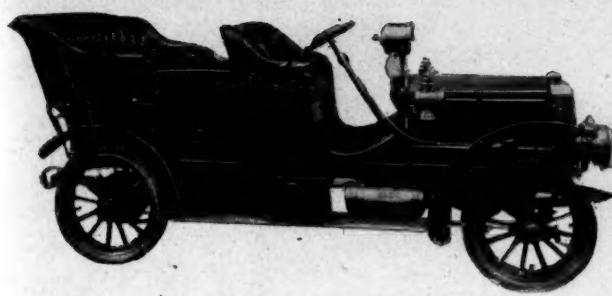
The C. G. V. is shown in a 70-horsepower chassis, a 30-horsepower landaulet by Demorest, a 30-horsepower limousine by Demorest, and a 20-horsepower with Mulbacher body. In general the 20-horsepower and higher powers follow the same lines as last year and are chain-driven. This year changes have been made in several essentials, including a three-point suspension of the motor and gearbox, all brakes enclosed, and of the expanding type, and the camshaft pinions enclosed. High tension magneto and supplemental coil and storage battery ignition is fitted to all sizes. There is also some slight change in the chain tension rods. The cylinders are cast separately with attached water plates. Valves are mechanically operated and placed on opposite side of the cylinders. The sliding gear has four forward and one reverse speed, with an expanding brake in a housing separate from, but attached to the rear corner of the transmission case, which is extended to take in the differential. The clutch is of the leather-faced cone type, on a special pinion shaft. Either brake can be disconnected from the clutch to facilitate starting on hills. The carburetor is of automatic double jet construction, hot waterjacketed. A combined throttle control and accelerator pedal is also fitted. The pump is gear-driven and water cooling is by a tank and a radiator placed under the fore end of the frame, the bonnet being distinct in its long downward sweep at its front.

Lebanon Motor Works—Upton

This concern is now in the big touring car line and besides a high-power motor merits recognition in this class by the adoption of a multiple disk clutch, which runs in oil; a five-sight feed mechanical oiler; three speed and reverse sliding gear transmission manipulated from a single lever band, and the use of direct drive on the high speed. Only one car is displayed. It has a four-cylinder motor, which is rated at 40 horsepower, with the cylinders cast in pairs and each with 4½ by 5-inch measurements. The three-bearing drop-forged crankshaft has its lubrication cared for by a separate lead from the oiler, which is carried on the dash. Twenty-five disks are used in the clutch, thirteen of which are steel and are fastened to the flywheel. The remainder, of bronze, are attached to the shaft connecting with the gearbox. Ball bearings of the Hess-Bright type are fitted to both shafts in the gearbox and from this shaft drive with direct transmission on the high speed is used. A floating rear axle is used, thus relieving the drive shafts within the axle of the strain of carrying the weight of the car. A few other points about the car is the use of a Schebler carburetor, I-beam front axle, 109-inch wheelbase, Whitlock radiator, interchangeable valves, a cooling fan clamped on by a bracket to the central portion of the radiator, and the main frame pieces offset alongside of the motor. In the double brake arrangement one set expands when applied within



THE 1906 STUDEBAKER CAR



NEW GROUT GASOLINE CAR

the rear wheel hubs and another set consists of friction bands operating on the outside of the same drums. Thirty-four by 4½-inch tires are used.

De Dietrich Importing Co.—De Dietrich

Two models are shown of the 40-horsepower only, one a chassis and the other a full touring car, seating seven people. The 1906 line embraces a 16-horsepower, 24-horsepower and a 60-horsepower in addition to the above, but are not shown, as they are of the same general type and specifications. The 1906 de Dietrich cars resemble in general appearance and outline the 1905 type, differing, however, in detail in a number of points. The motor has been simplified and presents a clean-cut general appearance. Valves are this year all operated from one camshaft as well as the levers, actuating the Simms-Bosch low tension magneto ignition. All valves and every connecting part is interchangeable throughout. The caps over the inlet valves form the ignition plates for the plugs, which in the 1905 models were fitted at the side of the cylinders. The caps over the exhaust valves are fixed by a special clamp, quickly operated. The lubricator is mechanically operated. The radiator is deeper and made of gilled tubes. The throttle is now connected to the clutch pedal, cutting down the engine speed actuating the Simms-Bosch low tension magneto ignition. All piping is well placed to facilitate getting at the engine. A half compression lever is provided to facilitate cranking. The change speed gear has been changed to the sliding sleeves type with a gate quadrant for the hand lever. The gear position locking device is contained in a box separate from the gearcase proper. Drive is through side chains with the gearbox carried well back to shorten the chains on the long chassis now prevalent. All shafts run on ball bearings, including all four road wheels. The control of the car is of the same system as last year, with the only exception that the accelerator pedal is placed further back between the two foot pedals and in a position more comfortable to the foot. Both emergency and shaft brakes are metal-to-metal, the hub brake expanding and the shaft brake contracting, with an equalizer at the point of cross connection on the emergencies. The dashboard gasoline tank of last year has been displaced by a pressure feed tank.

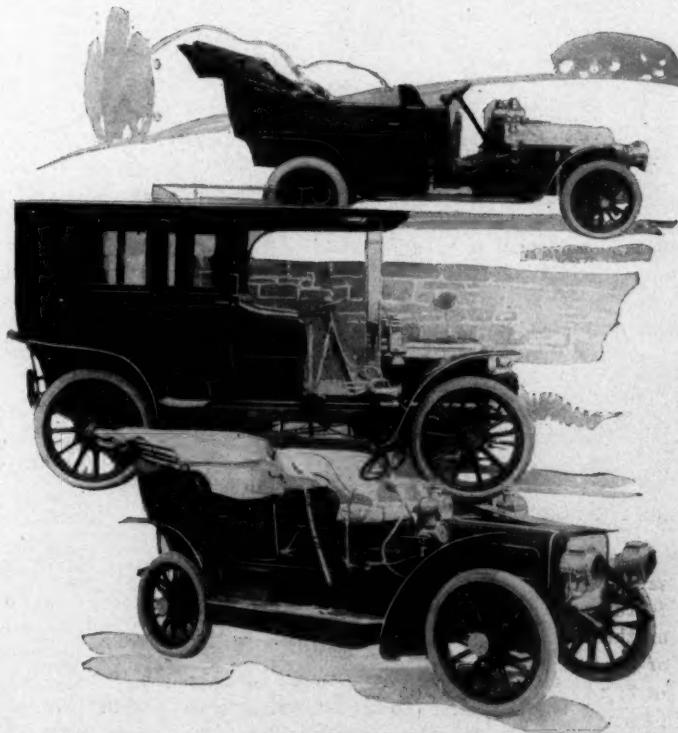
Studebaker Automobile Co.—Studebaker

Of the four gasoline cars and one chassis shown, model F, 28-32 horsepower, is a five-passenger machine with a four-cylinder motor with cylinders cast in pairs, as used on all of the company's machines this year, and possessing, among its other points, a three-speed ahead sliding gear set, cone clutch and jump spark ignition from storage cells. Model E, with a 20-24 rating, has a similar motor and transmitting equipment to F, and has a wheelbase 6 inches shorter. A third model with a 30-horsepower motor has low-tension, make-and-break ignition, in which the current is supplied by a Simms-Bosch magneto of the low-tension variety. In most low tension systems the make-and-break mechanisms are worked by vertical pushrods from a camshaft within the crankease, but in this they are driven by vertical revolving rods driven by bevel gears from the cam-shaft. The mechanisms for varying the spark are carried on the tops of the cylinders, as are the make-and-break parts, giving a very accessible construction. A fourth model has a landau body, 98-inch wheelbase and jump spark ignition and a 30-35-horsepower machine with cylinders having 4½-inch bore and 5¼-inch stroke uses the make-and-break ignition scheme.

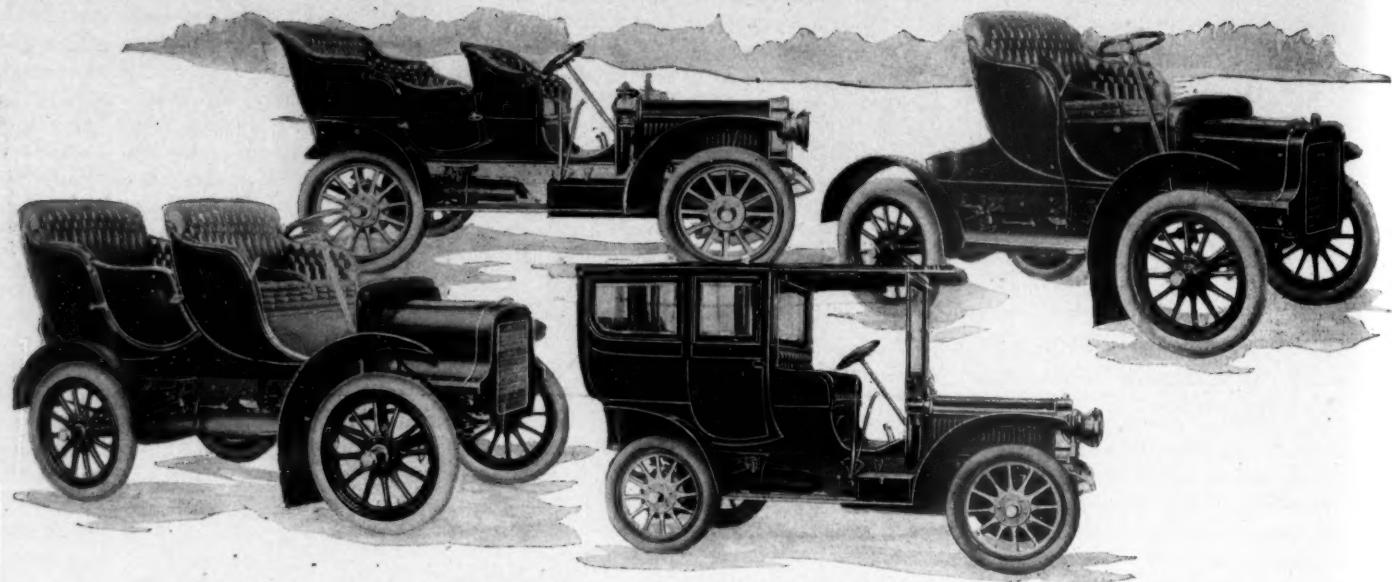
In all models vertical four-cylinder motors are used. Ball bearings are fitted in the road wheels, plain bearings within the gearbox and I-section axles are used in front. Drive is through a cardan shaft and floating rear axle to the road wheels. The gear sets are of the sliding variety, in which the main and countershafts are in the same vertical plane and both with their gears work in an oil bath. Wood bodies are shown on all cars and the upholstering is in leather. Tires of standard makes range in size from 32 by 4 to 34 by 4½ inches on the several models. In its electric display, which is made in the garden concert hall, is included a two-passenger runabout, with twenty-four cells of divided battery, and the drive from the motor carried beneath the center of the body is by chain from the countershaft. The radius of the machine is 40 miles. Other machines are a stanhope with practically the same battery and motor equipment, victoria phaeton with twenty-eight cells of divided battery, a high-speed stanhope with thirty-six cells of battery, a working radius of 50 miles and a speed range as high as 18 miles per hour, and a brougham intended for physicians' uses and which has a general design resembling that in the victoria phaeton.

Ariel Motor Car Co.—Ariel

The 30-horsepower model is shown in a touring car and a chassis. The motor has four vertical, individually-cast cylinders. All valves are mechanically operated, with the distinct feature that one camshaft is used, running across the motor heads and driven from the main shaft through a vertical shaft and bevel gears. Each valve is in thimbled housing, which projects diagonally and outwardly from the head, the inlets being on one side and the exhausts on the other. The same housings also carry the rocker arms, which have roller ends for the cam contact. By this construction the crankease is compact and without any projections other than the narrow lip for bolting the two halves together. It is cylindrical in cross section and each connecting rod crank pin runs in its own compartment. The drive is through a 10-degree cone clutch—with a friction plate at the universal to reduce the spinning tendency when the clutch is withdrawn—a sliding three-speed and reverse transmission and final drive by propeller shaft. Water circulation by a gear pump driven from the vertical shaft running to the camshaft, and cellular radiator. Ignition is by jump spark and storage battery. The gear change lever runs over a notched quad-



PANHARD, MORS AND DECAUVILLE



CADILLAC MODEL M

CADILLAC L

FOUR-CYLINDER LIMOUSINE

CADILLAC RUNABOUT

rant without a latch, the gear lock being on the transmission shifting rod. The brake lever applies expanding brakes in the rear hubs independent of the clutch. The foot brake is metal with contracting shoes on a drum on the propeller shaft. The spark and throttle lever are above the steering wheel. Springs are full ellipse in the rear and outside, and half-ellipse in front under the frame. The radiator is of somewhat narrow oval front view and extends below the crank, which comes through the radiator for the crank.

R. Bertelli & Co.—Züst

This exhibit marks the introduction to America of another Italian car of the first order. A polished chassis only is shown with the general features of present-day, advanced, European construction. The dash top line is relatively low with the pedal boards having a sharp upward slope, the general rakishness being further augmented by tilting the steering column well back, the lower box of the column being about midway of the engine length. The engine has four cylinders, cast in pairs and supported directly on the main side frames. The valves are all mechanically operated from one camshaft. Each pair has a large screwed-on, oval cover plate at the top with one water lead. The rating is 40-45 horsepower. The flywheel has fan blades and carries an extension covering in the clutch. The clutch is of the multiple disk type with fifty thin steel plates in its make-up. The transmission, four forward and one reverse speed, is of the selective type worked through a gate quadrant for the side lever. The gearbox contains the differential for the crossshaft, the final drive being by side chains. Water circulation is by gear-driven pump and honeycomb radiator. Ignition is by low-tension Simms-Bosch magneto, with make-and-break spark, driven on the same shaft with the pump. The tappet rods for the ignition are driven by a camshaft on the other side of the motor from valve camshaft. Two foot pedals only are equipped, one for the clutch and the other for a double-acting band brake working on a drum on the cross-shaft outside the gearbox. The side lever brakes, in the hubs, are internal expanding. Ball bearings are used throughout.

Smith & Mabley Mfg. Co.—Simplex

This New York-made car remains for this season much the same as it was during the past year and carries as its retained features, in spite of present tendencies, plain bearings in all of the road wheels. Of the three cars shown two are quite out of the ordinary. One is a hansom with the driver's seat located in front of the passenger compartment and the other is a seven-passenger vehicle with the five tonneau seats placed permanently in position. In this car three passengers occupy the back seats and on the sides of the tonneau, in front of these, are

two other seats with full fledged upholstered sides and backs. Between them is a narrow space for the back seat passengers to enter and leave. The third car is an open touring machine. The wheel bases for the three measure: Hansom, 106 inches; touring car, 111 inches, and seven-passenger machine, 115 inches. In all models the same type of 30-horsepower motor is used, with its cylinder measurements $4\frac{1}{2}$ and $5\frac{1}{2}$ inches. Mechanical motor valves, and two distinct sets of ignition are employed. One ignition outfit is a high-tension LaCoste magneto and in the other current comes from a storage battery. Two sets of spark plugs are used. The clutch is of the leather-faced cone variety. The gears afford four forward and one reverse speeds, all changes being through a single lever. Hess-Bright ball bearings are regularly fitted on the main and countershafts within the gearbox. In an extension at the rear end of the gearbox is carried the differential on the jackshaft and from this shaft a pair of side chains complete the transmitting system. The brake on the jackshaft is interconnected with the clutch, and those on the rear wheels are not. Solid front and rear axles are used, as are semi-elliptic springs in front and rear. The chain sprockets on the back wheels take the form of a circular flange bolted to the wheel spokes and with the teeth on the inner edge of the flange. Within this is the brake drum, so placed that the brakes are of the external band type.

American Locomotive Automobile Co.—Berliet

With twin factories in France and America, the American Locomotive Co.'s latest venture into the automobile game is marked by the production of a low-built car, with a chassis made of imported press nickel steel and narrowed in front. On the stand are shown a 40-horsepower polished chassis, a 24-horsepower landauette with a Kellner body, and a 24-horsepower open touring car. Cross stays are eliminated by attaching the engine and gear case to the rest of the frame. There are four cylinders, cast in pairs without joints, in the motor, the valves being mechanically operated and made of nickel steel. The camshafts and integral cams are made from tempered tool steel. The crankcase is lubricated by direct feed from a pump on the dash and by the splash system. The low tension ignition employs the Simms-Bosch magneto and igniters. The carburetor is of the float feed type, and the clutch, of the metal-to-metal type, is driven by contact with the interior surface of the flywheel drum. The pump is of the centrifugal type and is attached to the frame directly behind the radiator, which is of Megevet design of the honeycomb type. Hess-Bright bearings are fitted. The ball governor is carried on the exhaust cam-shaft gear, and acts on the valves inside the carburetor. Ignition and throttle valves are placed on top of the steering wheel,

but most of the acceleration is obtained by the use of a small pedal at the right of the steering column. Lubrication is effected by a combination of the exhaust pressure and positive feed. Transmission is of the sliding gear type, comprising four speeds forward and reverse, all operated by single lever. Power is transmitted from the change gear through the differential, to sprockets; thence to the rear wheels through Renold roller type chains. Chrome nickel steel is used in the gears and shafts.

Cadillac Motor Car Co.—Cadillac

It takes lots of space to show the full Cadillac line, for there are nine members of the household—a 10-horsepower single-cylinder runabout, a 10-horsepower single-cylinder touring car, a 10-horsepower car with folding tonneau, a 10-horsepower coupe, a 30-horsepower four-cylinder model with touring car body, one of the same type with runabout body, a 30-horsepower coupe, and two types of a 40-horsepower machine with touring car and limousine bodies. No change is apparent in the single-cylinder motors, which embody such Cadillac features as independent timing of the valves and the Cadillac carburetor, waterjacket and spark plugs. All parts are interchangeable. The copper waterjacket is still used, it being claimed that by using it there are no gaskets to burn, soak or blow out; no leaded joints to melt and no cracking of cylinders in case of a freeze-up. Also it is possible to change a cylinder without replacing a waterjacket. Planetary transmission is used, the gears being specially ground and hardened. On the single-cylinder cars there are two speeds and a reverse. The lubricator is of pump feed design, an arm extending to the hub of the flywheel on which there is a cam. This cam acts every revolution of the flywheel, which forces a small quantity of oil to each of the four bearings reached by this mechanical lubricator. The coil and switch of the jump spark ignition system is attached to the dash. Two sets of dry cells are fitted, one being designed for a reserve. A foot lever applies the slow speed, while the high is operated by a hand lever at the side of the car. Two band brakes are fitted. The differential drums are extra large. The throttle and spark levers are on the wheel and the steering mechanism are of the ratchet and pinion type. One of the features is a safety starting device intended to prevent a kick back. When the spark lever is advanced it causes a slide to obstruct the entrance of the crank, so that motor cannot be cranked when the spark lever is out of its normal position. A centrifugal pump attached to the frame of the chassis is responsible for the cooling system. The axles are of steel tubing, the rear being equipped with Brown-Lipe spur gear differentials. There are three springs used, two in the rear and one in the front. A rocker joint is fitted to the front spring, which permits one wheel to pass over a slight obstacle without jarring the occupants of the car or disturbing the level. The bodies of the runabout and small touring cars are of the victoria type. The rear wheels are keyed to a live axle shaft. Of the four-cylinder flock model H touring car carries five persons, has a wheel base of 98 inches and weighs 2,400 pounds. The bore of the cylinders is 4½ inches and the stroke 5 inches. Model H is the same except it has a runabout body. Model L has a 40-horsepower 5 by 5 motor, carries five persons, weighs 3,000 pounds and has a wheel base of 110 inches. The drive on both H and L is direct. Hess-Bright ball bearings are fitted throughout, including axles, front wheels, transmission and engine bearings. The transmission is of the planetary type, with three forward speeds and a reverse. The new commutator is placed horizontally on a vertical shaft with oil container.

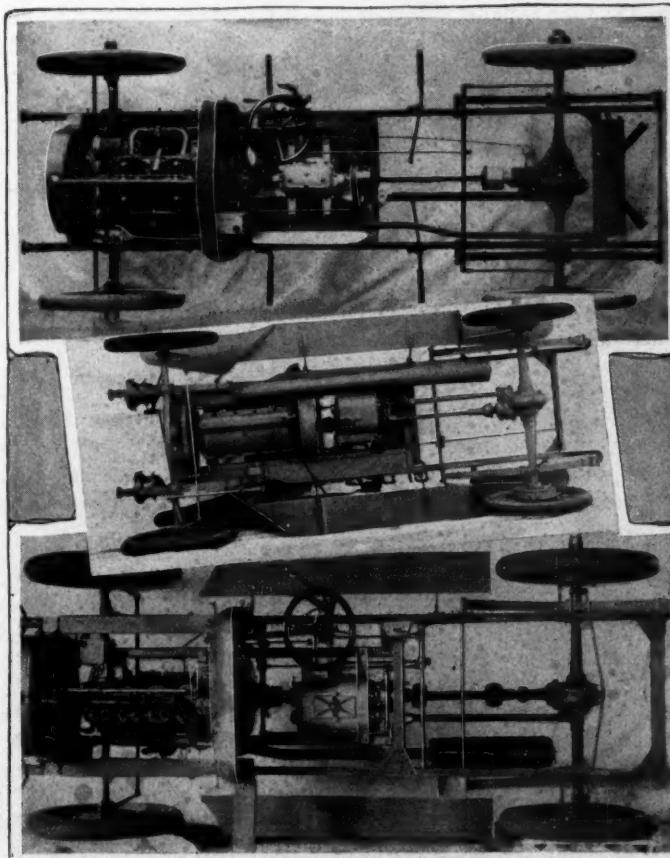
Rausch & Lang Carriage Co.—Electrics

This concern, with an experience in building electric machines extending over a period of 15 months since the expiration of its previous testing period, has a stanhope with twenty-four cells of divided battery, twelve cells placed in front and an equal number in the rear. A 1-horsepower motor of the Hertner type is used, and through it four forward speed variations and as many in reversing are obtained. The radius of action on each

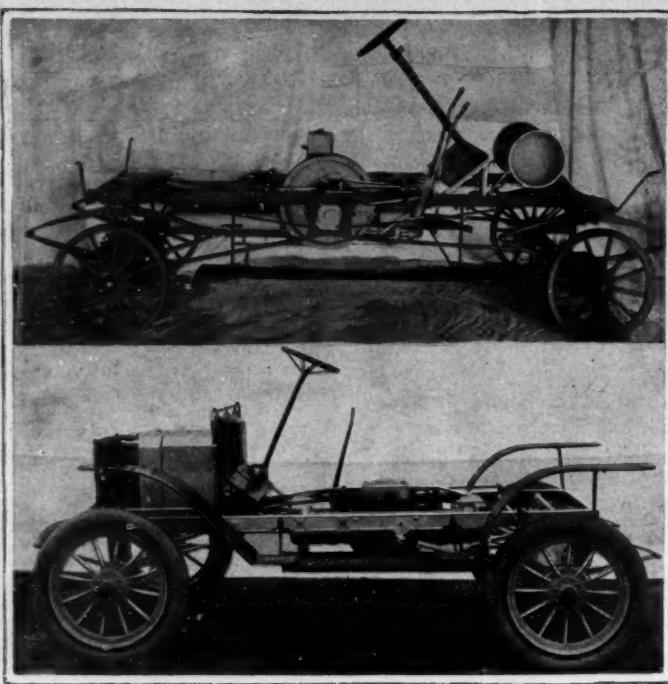
charge is fixed at over 75 miles and a speed limit of 19 made. Three and a half-inch Palmer single tube tires are used. Control is aided by three brakes; one on the motor worked through the controller handle, two internal expanding shoes working within drums on the rear hubs and a lever-applied electric brake. Side lever steering is used. In the coupe exhibited practically the same construction features are maintained throughout, and in the four-passenger depot wagon, with the exception of a 1½-horsepower motor, the same power plant is adopted. In all models drive to the rear wheels is by side chains.

Walter Automobile Co.—Walter

The 40-horsepower Walter car, and also the 60-horsepower chassis, are fitted with a four-cylinder motor with cylinders water-cooled and cast in pairs. The inlet valves are in the center of the cylinder heads and the exhausts in the bottom of ports and on the left side. By using rocker arms for opening the inlet and straight pushrods for the exhaust one camshaft suffices for both sets. The exhaust valves are accessible through capped openings in the port heads and the inlet cages are readily removable. Two distinct sets of ignition are used, one with current from a high tension magneto and current in the other flowing from accumulators. The cylinder measurements are 5-inch bore and stroke. A touch of 1906 French design crops up in using a cone clutch in which the flywheel spokes take the form of fan blades and the male part of the clutch is further a coned surface carried on similar fan-like blades. Both sets of blades aid in drawing gases from around the motor and aid the fan and water system in their work. The transmission is of the double sliding gear type with three speeds ahead and final shaft drive. A new shifting device is used for changing speeds. Instead of making use of sliding rods, rotary rods are called into service. All gears within the case are made from chrome nickel steel which is case hardened. An oil bath serves for lubricating within the gearbox. On the 60-horsepower car a selective gear set fashioned on Mercedes lines is supplied, and drive is standard. On this car the fan is carried from the front cylinder instead of from the center of the radiator, and the



RAINIER, OLDS AND MOON CHASSIS



CHASSIS OF THE LOGAN AND REO CARS

pressed steel side frames are heavily reinforced where they are offset at the dash. Half elliptic springs are fitted on both models, axles in front are of the I-beam type, ball bearings are used throughout in the road wheels and gearbox. Two internal metal-to-metal expansion brakes work on the rear hubs and a foot brake on the differential is interconnected with the clutch. The wheelbase varies between 110 and 122 inches, 31 by 4½-inch tires are used and the weight approaches 2,800 pounds.

Babcock Electric Carriage Co.—Electrics

Of the four cars exhibited by this Bison house, one is a stanhope, carrying forty cells of battery located beneath the seat and having a motor with six speeds ahead and four reverse. Side lever steering is used. The next model, a stanhope of larger size, has the same number of battery cells and is controlled through a tilting steering column. Its braking system combines an electric and a band brake. The four-passenger depot wagon carries a pair of motors, each geared to its respective wheel. Current is supplied by forty-eight cells of battery. The last wagon, styled the Babcock special, is of the divided battery type, part carried in front and part in rear, and takes its power from one motor through a double chain reduction to the road wheels. Wheel steering is employed and the motor in this type is carried in the body beneath the seat, whereas on all of the other models it is carried on the rear axle. Twenty-four cells of battery are carried and the motor is wound for six speeds ahead and four reverse. On all four of the machines fairly high radius of travel on each battery charge is quoted and the speed rates are well up.

Columbus Buggy Co.—Electrics

Of the two electric vehicles displayed by this concern, the four-passenger surrey is the more attractive, although the stanhope has its points. Twenty-four cells of battery are carried and a mileage of 60, with an average speed of 16 miles per hour is claimed on each battery charge. Side lever steering is used. One motor of Elwell-Parker design is carried beneath the seat and from it drive is through a spur gear reduction to the jackshaft and thence to the back wheels by double side chains. Emergency brakes are foot-expanding within drums on the rear hubs, and for general use a band brake on the motor shaft is used. In its stanhope a divided battery is employed, as is used in the surrey, and the same number of battery cells has a claimed mileage on every charge of over 50 miles at a

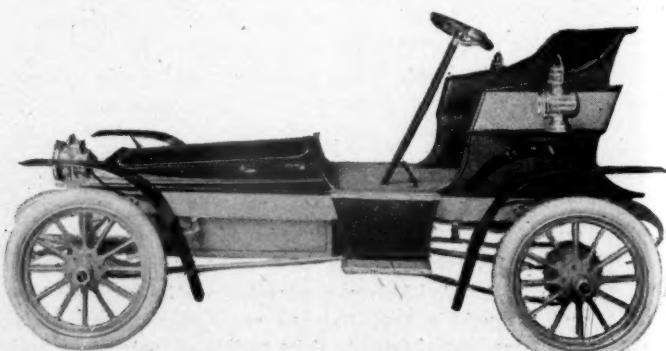
speed of 20 miles per hour. A 1½-horsepower motor with four forward and four reverse speeds is used. In both vehicles the controller handle is carried within the left end of the seat and side lever steering is adopted. The stanhope has 30-inch wheels fitted with 3-inch pneumatic tires.

Windsor Automobile Co.—Windsor

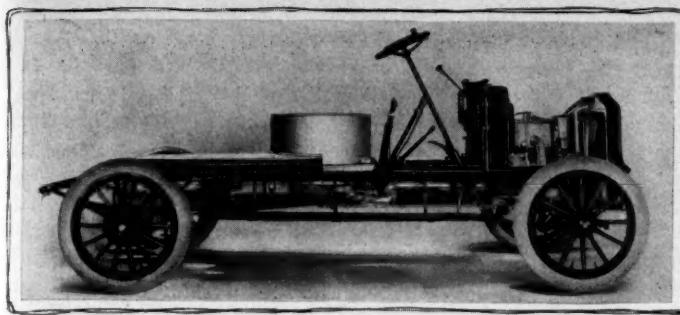
A chassis and complete touring car are displayed in the armory basement by this company. Both are of the friction-drive type, and in each is used a four-cylinder Milwaukee motor, in which the cylinders are cast in pairs, with interchangeable mechanical valves, all located on the left side and opened from one cam-shaft. Standard water cooling by radiator and pump and assistance through a fan is employed. Ignition is by jump spark, with current taken from dry cells. In transmitting the power from the motor to the rear wheels it is featured, as in all friction-drive machines, that both a gear set and differential are done away with. The crankshaft is extended to the rear almost as far as the back axle and has keyed to it, midway of the axles, two large leather-faced disks, which are slightly over 1 foot apart. Between them is a divided crosshaft, with sprockets on either end, and side chains connecting with other sprockets on the rear wheels. On this divided crosshaft are two steel friction wheels, carried one on the inner end of each half of the shaft. The diameter of these friction wheels is lightly less than the distance between the opposing forces of the two friction disks on the extended crankshaft. The two halves of the cross-shaft are carried on pivotal bearings of the ball type, so that in controlling the car the motor can be running and the two-friction disks revolving without the friction wheels contacting with them. To go ahead a lever movement contacts one friction wheel with the front disk and the other with the rear disk, thereby giving a forward movement to both rear wheels. In reversing, the contacting position of the friction wheels and the disks is reversed. To get changes of speed the friction wheels are slid along the halves of the divided shaft. In accomplishing this, recourse is had to a hand wheel below the steering wheel. A three-point suspension for the motor is used. Two of these points are at the sides of the crankcase, about the center, and are in the form of arms from the case sides, pivoted to the inner sides of the frame pieces. The third support is at the rear of the crankcase and beneath a crankshaft bearing. The frame is standard, with offset side pieces. Ball bearings are used in the road wheels, tubular axles serve, and the wheel base is 106 inches. The body is conventional with its wide side entrances and forward bonnet.

Lansden Co.—Electrette

The acknowledged feature of the pleasure electric vehicles in either shows, is the new Lansden Electrette, a runabout vehicle of very rangy lines, having a 90-inch wheel base and possessing the unique feature, that the sixty cells of Edison battery are carried on the frame in front, beneath a very low bonnet, so that by raising the front of the bonnet the tops of oil battery cells may be seen. Carrying the battery here places the seat well over the back axle. The low bonnet, as well as a very low dash, gives the impression of a racing car. The vehicle is intended for road use and has a guaranteed mileage of 50 to 60.



LANSDINE ELECTRIC RUNABOUT



CHASSIS OF THE WHITE STEAM CAR

miles and a speed of 25 miles per hour. The company is further arranging for the bringing out of a similar vehicle, with a running radius of 75 to 100 miles, with the same speed. From the battery current is taken to a 4-horsepower General Electric Co. motor and from this through a double chain reduction, the first by a short chain to a countershaft, thence by side chains to the road wheels. Four ahead speeds and two for reversing are given by the motor. Coupled with the battery system is a large electric headlight, carried in the front of the bonnet. On the steering wheel is a pair of revolving hand grips, which control an electric heater, installed for the comfort of occupants. Three controlling brakes, one of the band type, on the countershaft, and two expanding shoes, working within the rear wheel drums, are fitted. A made up frame, consisting of a central wood section, bolted between an upper and lower channel iron sections, is used; front and rear axles are of the much talked about I-section class; 3½-inch Continental pneumatic tires are fitted in front and rear, the latter pair carrying non-skidding treads. The wheels have a 30-inch diameter. Ball bearings are used wherever possible and the weight of the machine is 1,600 pounds.

Johnson Service Co.—Steamer

This Milwaukee concern has in its booth two vehicles of practically the same design, but different finish. Each is propelled by steam power and is of the heavy limousine variety, with a rear closed compartment for two or four passengers. The front seat, carrying two, is protected by a glass front, with massive framework surrounding it on either side, and a canopy projection. To all appearances vehicles resemble gasoline machines in many regards. The motor is a four-cylinder plant, placed vertically in front under a bonnet, and from it drive is by shaft to the rear axle. In considering the steam-generating plant, it is found that the generator is of the spiral coil type, in which twenty-four coils, made from imported seamless cold drawn steel tubing, and each capable of withstanding 6,000 pounds pressure, are used. These coils are placed horizontally in a compact space, being arranged in six sets with four in each set. The coils are joined at the ends by right and left couplings, which are turned from solid steel. The joints being at the ends they are not subjected to heat from the burner. The water is forced into the top and the steam comes out at the bottom. Over 400 feet of continuous tubing is used in the boiler. Nestling the twenty-four coils close together makes it possible to carry this length of tubing in a box-like space 20 inches square and 17 inches high. The governor is set to operate at 300 pounds pressure. The burner is designed for kerosene use. In the motor four single-acting pistons of the trunk style are used, and in the crankcase is a forged crankshaft. The valves are of the poppet or lifting type and operated from a camshaft, as in a gasoline motor. There are three sets of cams, so as to give $\frac{3}{4}$ cutoff, $\frac{1}{2}$ cutoff or a reverse. All of this is accomplished by a longitudinal movement of the camshaft, which is done from the driver's seat.

Central Park Automobile Co.—Spyker

Coming from abroad with the reputation for being dustless, there is no special feature to indicate this. Features of frame are that the sides are inverted U-shaped, with the inner wall from the radiator to the back of the gearcase extending down and back in a curve to meet and support the respective side of engine and

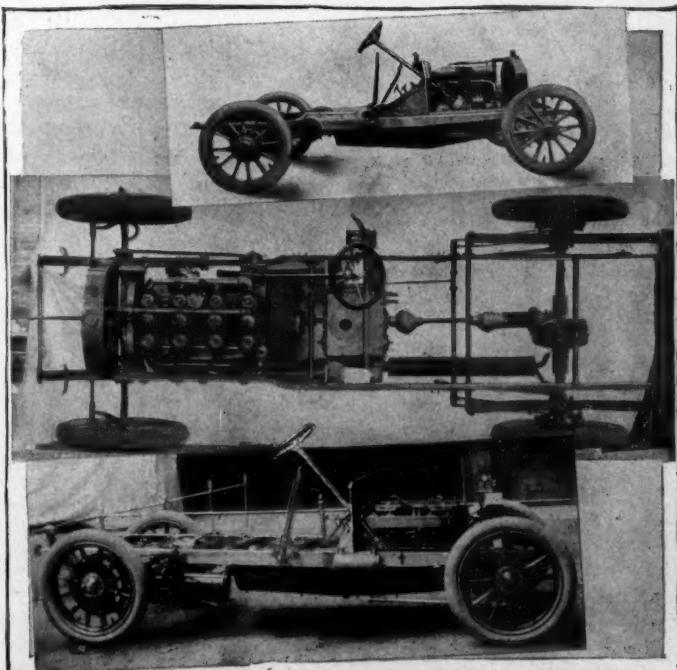
transmission cases. The front ends of the frame flare out and down to take the side half elliptic springs. The rear springs are placed outside of the frame and are connected across at the rear with platform springs, held at its center by a bowed iron projecting from rear cross frame. The front wheels turn on ball sockets. Four vertical cylinders, cast in pairs, with screwed-on top water plate, have mechanical valves on opposite sides. Camshafts are extended through cross front frame member with the commutator on the left shaft at the front end and gear pump on the right shaft. Both are exposed in front of the radiator. The carburetor is waterjacketed and ignition is by jump spark. The cellular radiator is shaped like a Royal Tourist. A leather-faced cone clutch, sliding gear, three speed and reverse transmission and shaft drive. Brakes interlock with a clutch.

Daimler Mfg. Co.—American Mercedes

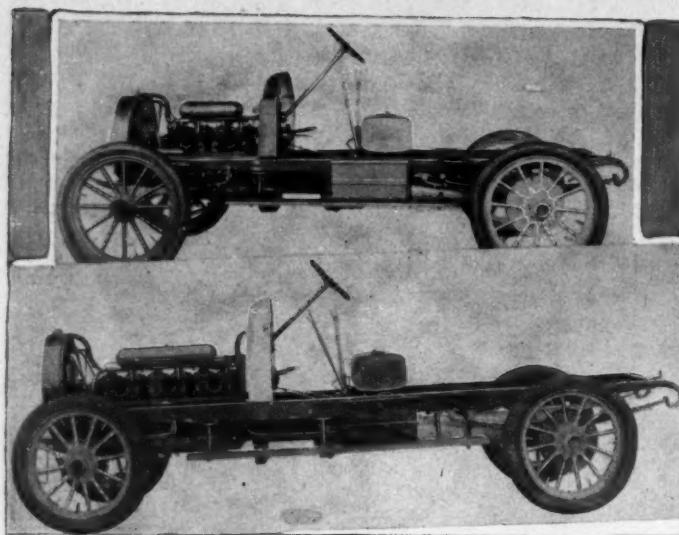
This car is an exact reproduction of the German Mercedes in every particular—body, motor, transmission, etc. Prominent among the features noticed is the change in transmission, the car being equipped with a four-speed sliding gear type. Four spraying nozzles are found on the carburetor and four brakes have been fitted, two of which are water-cooled. These are among the new features. The designer has kept the best of the old things, notably the scroll design of clutch, make-and-break ignition with magneto current, governor, hand and pedal control of throttle and spark timing lever on the steering wheel. The four forward speeds and reverse are controlled by a single lever. There is a 70-horsepower motor, the valves being mechanically operated, with the inlets in ports on the right and the exhausts on the left. The only noticeable difference in the make-and-break igniters is that they are a little more compact than last year. The magneto is driven by a separate shaft, connected by gears with the inlet camshaft. The centrifugal water pump is driven off the inlet camshaft by a gear. Lubrication is effected by means of a twelve-feed sight lubricator. Oil is forced into the crankcase by means of a single plunger pump. The lubricator is supplied by pressure from a large tank on the left side of the chassis and is controlled by a center stop cock.

Matheson Motor Car Co.—Matheson

With its 40-horsepower touring car finished in cherry red and black, with a red running gear, the motor of the 60-65-horsepower machine and a section cylinder showing the low-tension, make-and-break ignition, compose an attractive display made by this maker. Both motors are alike except as to size. The



CHASSIS OF THE ZÜST, HAYNES AND PEUGEOT



CHASSIS OF FOUR AND SIX-CYLINDER NATIONAL

casting of the cylinders separately and placing both inlet and exhaust valves in separate chambers in the cylinder heads is featured. In operating them a single camshaft carried on the left side of the cylinder heads is used, the shaft being driven by a shaft and bevel gears from the front end of the crank-shaft. The cams used are of the ordinary type, but the rocker arms for opening the valves carry on the end bearing on the cams, large rollers which contact with the cams. The opposite ends of the arms rest on the valve stems, which are placed vertically. By thus carrying the camshaft near the cylinder heads the maker has gained the overhead valve action and has the valves in the center of the cylinder heads without the use of vertical pushrods for actuating the rocker arms. A decided innovation is the placing of the governor regulating the carburetor throttle on the fan shaft. The fan is belt driven from the crankshaft. The low-tension magneto is carried on the cylinder base at the front and to the left, and the make-and-break mechanisms are placed on the same side of the cylinders. In the motor flywheel is a disk clutch of three disks, one attached to the flywheel and two to the driveshaft. Changes in speed are made through a three forward-speed sliding gear set and final drive is by two side chains. A typical side entrance touring car body seating five passengers is used.

C. H. Blomstrom Co.—Queen

One new model appears in the Queen exhibit, a four-cylinder car known as model K. The rest of the line consists of models E and F, the former a side entrance touring car with detachable tonneau and the other a runabout. On model K the horsepower is 26-28, from a four-cylinder vertical motor under the hood. The motor in model K follows typical American lines in having the cylinders cast in pairs, each pair an integral casting with mechanical inlet and exhaust valves located in the bottom of ports on the left side. On the one camshaft employed, which, incidentally, is carried in the top part of the crankcase, are eight cams through which both sets of valves are opened. This shaft is driven by gear from the crankshaft, a separate housing enclosing both of the gears. A simple piping system serves for the inlets and exhausts, that to the former being a U-casting, with each arm entering the center of the port on each cylinder pair, whereas the exhaust, a single casting, has a separate branch communicating with each exhaust valve cage. Both sets are secured through a pair of yokes, one for each cylinder set, the yokes themselves held to the castings through two studs and bearing on the inlet and exhaust piping. Ignition is by jump spark with spark plugs carried vertically in the center of the caps above the inlet valves and with the commutator on the top of a vertical shaft at the rear of the motor. The bore is $4\frac{1}{4}$ and the stroke is $4\frac{3}{4}$ inches, with the wheels 32 by 4 inches and the wheel base 100 inches. The frame is of

pressed steel and the springs semi-elliptic. Irreversible steering gear and internal and external hub brakes are part of the equipment, and the transmission is of the sliding gear type, giving three forward speeds and one reverse. The control is on the steering wheel. Bevel gear drive is fitted. The car weighs 2,000 pounds and accommodates five persons. Model E has an 18-22-horsepower two-cylinder opposed motor placed under the body, with the bore and stroke 5 inches. On the front the wheels are 30 by $3\frac{1}{2}$ and on the rear 30 by 3 inches. The wheel base is 84 inches. The frame is of angle steel and the springs full elliptic. The brakes are on the differential and the planetary transmission furnishes two speeds forward and reverse. Chain drive is employed and the ignition is by jump spark from two sets of dry batteries. The weight is 1,600 pounds. The runabout also has a two-cylinder opposed motor which develops 12-14 horsepower, with a bore and stroke of $4\frac{1}{2}$ inches. The wheels are 28 by 3 inches and the wheel base 76 inches. Planetary transmission and chain drive are also found.

Hewitt Motor Co.—Hewitt

The Hewitt runabout is a single-cylinder car, with a horizontal motor in which every part of the power plant is carried on a frame attached to long elliptic springs, connecting the front and rear axles. Both valves are mechanically operated, and the same shaft drives through a worm gear above the shaft set of seven double-gear wheel pumps, which feed corresponding oil tubes leading to the various bearings. Low tension magneto ignition is used, with the magneto chain-driven. The spark and oil feed to the pump are operated in conjunction. Drive is through a two-speed planetary gear, with the high speed having a large plate thrusting against springs, with 1,200 pounds tension. The water tank is a round, aluminum casting, with a non-return filling cap. The side frames are pivoted on the engine frame, to prevent vibration, and the body tips on a hinged back to allow for inspection of the power plant. The same power plant is used in a town car. There is also a touring car, with a four-cylinder vertical motor in front, which is of the marine type and open base, driving through a sliding gear with three speeds, a cone clutch and propeller shaft. The entire power plant has an under pan to protect it from the mud. Up-jump leaves are placed on the springs of all cars.

Grout Brothers Automobile Co.—Grout

The taking up of the gasoline car by the Grouts makes this exhibit interesting. On the stand are shown a complete side-door entrance touring car, a chassis of the same and a complete torpedo-storm runabout. They have a 30-35 horsepower four-cylinder balanced motor, with the cylinders cast separately and with a bore of $4\frac{1}{2}$ inches and a stroke of 5 inches. There are forced ventilation and mechanically operated inlet valves, which are interchangeable with the exhausts. The pistons are fitted with four eccentric rings. Lubrication of the pistons is effected through tubes running to the cylinders from a force feed lubricator. The crankshaft, which is $1\frac{1}{2}$ inches in diameter, has five bearings, babbitt in bronze boxes—one at each end and three intermediate bearings. The brackets supporting the upper half of the crankcase are on the upper half. The connecting rods are of drop forged nickel steel and are adjustable at the hollow wristpin. The connecting rods and all working parts of the camshafts are oiled by splash from the crankcase. The transmission is of the sliding gear type, three speeds forward and a reverse, controlled by one lever. The gears are enclosed in an aluminum case and run in oil. The flywheel has a cone clutch with a wide, smooth face, which is disengaged by a foot lever or either brake lever. The cylinders are water-cooled, circulation being maintained by a large gear pump directly driven from the half-time shaft. There is a high tension ignition system, with one coil and distributor. The carburetor is of the float feed Holley type. The drive is from the transmission to the countershaft, with side chain to each rear wheel. The steering gear is of the irreversible worm and sector type. The

gas and spark are controlled from the steering wheel. The wheel base is 100 inches and the tread 56 inches. The frame is of armored wood and the springs semi-elliptic, 42 inches long and with seven leaves. The axles are solid and 1½ inches square.

Breese-Lawrence-Moulton Co.—B. L. & M.

A novel racing runabout with a two-cylinder, 10-12-horsepower Aster motor, driving through a cone clutch, a three-speed and reverse sliding gear and propeller shaft to differential on the rear axle, is the attraction presented by this new concern. Cooling is by belt-driven pump and honeycomb radiator. Ignition is by jump spark. The frame is supported on four one-fourth-elliptic springs and is particularly flexible. The seat is held very close to the frame and will back toward the rear. The steering column has a very sharp rake, the angle being about 20 degrees from the top frame-line, due to the sharp rake of the steering column. This same factor means a low position for the pedals, which push forward in almost a straight line from the seat. The change-speed box is built in identical lines with that used in a Panhard racer, very small, narrow in width and relatively deep. The gear sliding rod comes out of the case on the left side, about midway down, and is connected through a rack and segment pinion to the change-speed lever operating over a segment rack. Obviously the side hand levers are notably short—about 14 inches over all. A larger model is also made with a 22-horsepower Aster motor.

Westinghouse Companies—Westinghouse-Schmid

There is shown a 30-horsepower chassis with four vertical cylinders cast in pairs and with valves on both sides. The fan-bladed flywheel has an expanding metal-to-metal clutch in its extended hub. The drive is continued through a four-speed and reverse transmission case and side chains. The speed-changing lever works through a gate quadrant with the selective rods coming out of the gearbox to match the cross-over head. Three main pedals are used, the left for the clutch, the center for a band brake on the gearbox forwardly extending shaft, and the right for a band brake on the cross-drive shaft, carrying the front sprockets. The brake lever works the expanding rear hub brakes only and has no connection whatever with the clutch. Water circulation is by gear-driven pump and honeycomb radiator. Ignition is by low-tension magneto, gear-driven. Lubrication is by force feed, mechanically-driven pump through dash board oil case. The car is made in Havre by the French Westinghouse factory and is known as the Westinghouse-Schmid.

Dolson Automobile Co.

This maker shows two cars of 35-40 and 40-50 horsepower, fitted with vertical four-cylinder Continental motors. Drive is through a three-speed sliding gear set and shaft drive to the rear axle. An interlocker prevents changing of speeds with the clutch engaged. The larger car has an aluminum body with a 110-inch wheel base, worm and sector steering gear, three brakes, 34 by 4-inch tires. Hyatt roller bearings in road wheels and plain bearings in the gearbox. A force feed oiler is used. Both models use pressed steel frame with full elliptic springs in the rear on the small car and half elliptics throughout on the larger model. The smaller car, except for a 106-inch wheel base, is identical with the larger model.

E. W. Bliss & Co.—Bliss

This concern, with a world-wide reputation as torpedo builders for the American government, has been experimenting in the building of motor cars for 3 years, but has refrained from placing them before the public until the present time. It is showing one chassis model, fitted with Healy and Demorest French bodies. In the motor such characteristic points as cylinders cast in pairs, with valves on opposite sides; valves, flat-seated and inlets, and exhausts made interchangeable; high tension magneto, with magneto driven off the inlet camshaft; LaCoste oil on the dash and oiling by a Lunkenheimer lubricator, are met. Of the moving parts within the crankcase it might be

noted that the crankshaft, made from selected nickel steel, is extra light. Both camshafts are cut from one solid piece of nickel steel and are then case hardened. The pistons carry four ground compression rings and are connected with the crankshaft through a set of I-section connecting rods, regularly fitted with phosphor bronze bearings at both ends. Piston pins are made from chrome nickel steel. A three-point suspension is given the aluminum alloy crank case. The exhaust piping contains a manifold before the muffler is reached for cooling the gases and avoiding back pressure. The flywheel, made from cast steel, has a fan-like blade for withdrawing gases from around the motor. Flexible connection between the motor and gearbox is through a scroll type of clutch, which runs on Hess-Bright ball bearings, and is contained in an oil bath. The gearbox is of the Panhard sliding set, giving four speeds and reverse, all gained through the use of one lever. Three-point suspension is made use of in supporting the gearbox. By extending the gearbox slightly to the rear, accommodation is provided in it for the differential gear, carried on a jackshaft, from which drive to the rear wheels is through a pair of imported Brampton chains. The differential brake is of the internal expanding type, and besides running in oil is housed within the gearbox. A pair of emergency expanding brakes works within the rear hubs. Universal swivel radius rods are used from the rear axle to the gearbox supports. In the running gear the axles are regularly made in I-section, from specially treated nickel steel.

Smith & Mabley—Mercedes, Panhard and Renault

All of the machines exhibited by this concern are referred to under other heads, but let it here be sufficient to say that this importing concern shows two 24's and a 35-horsepower Panhard, two Renault limousines of 20 and 30-horsepower respectively, two other Renaults of 10-14 horsepower and a 35-horsepower Mercedes. Noteworthy in connection with this exhibit is that the styles of cars shown are changed each day so that visitors attending on successive days find an entirely different car array on each visit. Most of the designs are of foreign make and combine comfort and convenience to a marked degree.

Cryder & Co.

Cryder & Co. show a Leon Bollee chassis and two touring cars of the same make, all of 40 horsepower. The Bollee is fully described under the list of cars shown by Norris N. Mason.

Carey Motor Co.—Carey

The gasoline motor used on this car has five air-cooled cylinders revolving around a stationary crankshaft horizontally placed across the frame in front of the dash. All valves are mechanically operated on opposite sides and but one cam only is used on each side. All five connecting rods are grouped on one stationary crankpin. This is accomplished by having the shoe at the lower end of each rod one-fifth on a complete circle. The assembly is held in place



QUEEN RUNABOUT

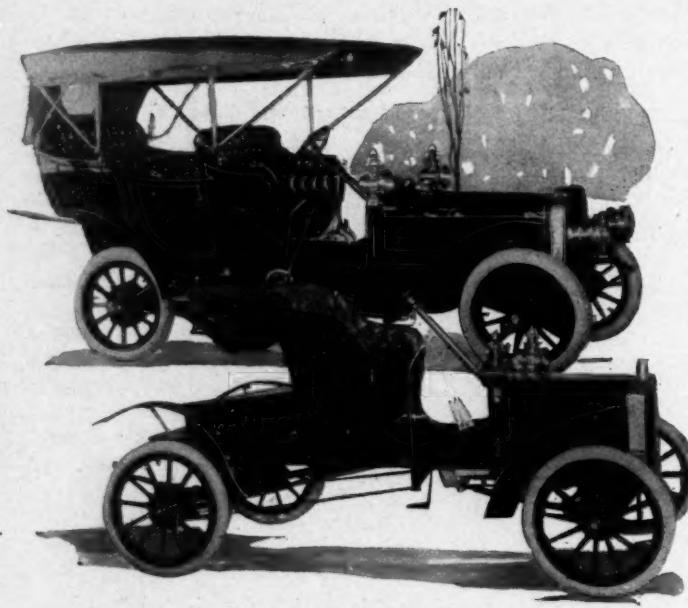
FOUR-CYLINDER

TWO-CYLINDER QUEEN

by two rings, one on each side. The cylinders explode alternately, giving two and one-half explosions to what would equal one crank revolution, it being understood that the cylinders revolve and set at the same time as a flywheel. The drive is by chain to an individual clutch gearcase of the Winton type and thence to the rear axle another chain to the rear axle. The motor weighs 276 pounds, delivers 10 horsepower at slow speeds and has a bore and stroke of $3\frac{1}{2}$ inches.

Ford Motor Co.—Ford

The Ford runabout wonder, which appeared Tuesday for the first time, has four cylinders cast in pairs, with mechanical valves on the left, all in the bottom of ports, and lifted from below by vertical pushrods worked from a camshaft within the crankcase. The pushrods work through brass guides in the top of the crankcase. The camshaft is enclosed in the crankcase, extends through the front of the case, and carries caps on top of the cylinders. With each pair of cylinders is cast the aluminum tube to the water radiator. The crankcase is tubular cylindrical, with two inspection plates on the left side and flanged at its back end, where it is bolted to an aluminum casing surrounding the planetary transmission. This casing has two side legs at its rear, which reach to the pressed steel side frame members, giving a closed case for



FORD SIX-CYLINDER AND FOUR-CYLINDER RUNABOUT

the transmission except at the top. The front of the motor rests at the center point of its crankcase on a drop-looped pressed steel cross frame member. This gives the motor and gearbox, which are combined, a three-point suspension on the chassis frame. The drive from the gearcase is identical with that on the six-cylinder car, having a ball joint at the front end of the propeller shaft. The hanger for this ball joint has two strut rods running diagonally to the outer ends of the rear axle, again giving a three-point suspension; in fact, three-point suspension is used throughout, inasmuch as the front spring is five-leaf half-elliptical extending crosswise and above the axle, hanging at each end in shackle plates to a fitting on the top of the I-section front axle. There are rods which come to a point and meet in a hanger piece attached to the flange, where the rear end of the crankcase and the front end of the gear containing case are bolted together, thus giving another triangular suspension. The flywheel is cast with fan spokes and is placed on the end of the crankshaft in front of the motor. Forward of this is a spur gear which drives the spur pinion of the pump, which is in the base of the radiator. The radiator has vertical tubes with a generous water tank at the top. The crankshaft is a three bearing forging. The front and rear bearings are 3 inches long and the bearings between the pair of cylinders is $2\frac{1}{2}$ inches long. All crankshaft bearings are $1\frac{1}{8}$ inches in diameter and run in babbitted bronze bearings. The cylinders are finally reamed and the pistons

ground. On the pistons are four rings, three being above the hollow steel wrist pin and the fourth between these and the piston top. The connecting rod is drop forged, bronze bushed at its upper bearing, which is split. The lower end is babbitted and hinged. Crankshaft bearings are ground. Cylinders have a $3\frac{3}{4}$ -inch bore and $3\frac{1}{4}$ -inch stroke, giving 15 horsepower at 1,400 revolutions. Motor lubrication is by a McCord oiler, one lead running to the crankcase and the other connecting with the differential housing. Ignition is by jump spark, with Splitdorf four-part vibrating coil on the dash. The spark plugs screw into the intake caps. A Holley carburetor is used. The piping from the carburetor is a T-shaped aluminum casting. Running parallel to the top of this pipe is the exhaust piping, with four short branches to the ports. The muffler is well back under the body. The planetary gear gives two speeds and reverse and has steel gears cut and case-hardened. The shaft is $1\frac{1}{16}$ inches in diameter. The propeller shaft has the same diameter. The live rear axle has divided drive shafts. The drive from the shaft is through a bevel pinion and a bevel gear differential. Each axle is $1\frac{1}{16}$ inches in diameter and the aluminum axle housing has a wall $3\frac{1}{16}$ -inch thick. The axle and rear wheels are carried on Hyatt roller bearings and the front wheels on ball bearings. There are three pedals. The left is a brake on the transmission, center for the reverse speed and the right acts on the expanding emergency brakes. The steering wheel has the spokes arched downwardly. The irreversible steering gear is housed in a drum-like casing just beneath the steering wheel. This casing is the top part of a brass tubular casting running to the dashboard, where it is attached by a flange just above the top line of the floor boards. The steering column continues through this to a point well forward, where it has a bearing in a bracket attached to the frame. The tie rod is back of the axle. Throttle and spark levers are placed under the steering gear casing. The current is supplied by two sets of five dry cells each. The seats are not divided and are upholstered with leather over hair and springs and ironed for a top. The box at the back of the seat on the body platform is full width at the front, coming to a sharp point at the rear. The straight through pressed steel frame members are 21 inches apart over all. The rear springs are full elliptic carried outside of the framepieces. Under the seat is the gasoline tank. The wheelbase is 86 inches and the wheels are 28 inches in diameter, shod with $2\frac{1}{2}$ inches G & J detachable tires. Shore leather fenders are used. A regular folding metal bonnet covers the motor. The little car weighs 700 pounds and sells for \$500. The six-cylinder made its appearance late Sunday afternoon. The cylinders are separate castings with $4\frac{1}{4}$ -inch bore and stroke. It is rated at 40-horsepower. Mechanical valves are all lifted on the right by barrel-shaped valve springs. The pressed steel side frames are straight through and are spaced 27 inches apart over all. Ball bearings are in front and Hyatt roller bearings on the rear. The differential has Hyatt roller bearings with ball thrust. The wheel base is 114 inches.

Napier Motor Co. of America—Napier

In all sizes of the Napier cars but the 60 horsepower, the inlet valves are mechanically operated from overhead by tappet beams. In the 60 horsepower the valves are all straight lifts from the cams. All models have the valves on one side. With a bearing in the forward and in the middle supporting arms of the crankcase is a chain-driven shaft on which is mounted the water pump and the throttle governor, just above which is the carburetor. On the entering side of the carburetor mixing chamber is the air inlet valve governed by a side-placed diaphragm actuated by a by-pass from the water system. Driving is through a cone clutch, sliding gear transmission and propeller shaft in all models but the 20-horsepower landauette, which is side chain driven. Ignition is by synchronized high and low tension through a single coil and high and low commutators on the dash, driven by an upright shaft. The exhibit consists of an 18-horsepower runabout with victoria body with four cylinders, a 60-horsepower chassis with six cylinders and body shown separately.

The Motorist In Grave Style



THE man that owneth a motor car is of few days and full of microbes. He covereth his face with a mask, and lo, he rideth forth in the morning and in the evening, and looketh not to the right nor to the left. His horse friends curseth him from afar off and fleeth to the side roads as he passeth by. They layeth in wait for him in dark places. He is puffed up and his chest doth expand and he rideth with great speed, even as the wings of the morning, when lo, the officers steppeth forth from behind the bush and taketh the wind out of his sails. He proceedeth on his way with meekness.

He goeth not far, however, before he hath troubles and divers vexations and groanings of spirit, because his machine halteh by the wayside and he knoweth not why. It stoppeth and will not be moved. His troubles tickleth the devil nearly to death, and bringeth smiles upon the face of the man who standeth by the wayside.

At first, he looketh into his battery box to behold if there might be a loose connection. He findeth it not. Next, he investigateth the plug to see if it sparketh properly and if it sparketh to his liking he wondereth and is in sore travail of soul and sayeth in his heart, "What is it?" for he knoweth he is up against it.

He stretcheth forth his hand and proceedeth to turn the crank; and he cranketh to a finish, but it availeth him naught. His soul is weary of life when he perceiveth there is nothing doing, and he at once proceedeth to explore the buzzer. When he finds that it buzzeth he sayeth to himself, "How long will it be, ye gods, until I shall understand this mystery?" And forthwith he sweateth great drops of moisture that falleth upon the ground and wettest it.

And he casteth off his coat and stretcheth forth his hand and once more proceedeth to manipulate the crank with a vengeance that nearly capsizeth the vehicle, and it resulteth in naught except that the crank kicketh him in the ribs, dislocateth his shoulder, and bringeth forth sundry obnoxious and profane utterances from his mouth, greatly to the distress and consternation of the wayfarer who passeth by. Next, he investigateth the carburetor; yea, he entirely taketh it apart into a multitude of pieces, even as the sands of the seashore, but findeth nothing that indicateth wherein the diabolical mischief lieth. He then looketh into the gasoline

tank which he expecteth to find empty; but lo, it containeth an abundance of fuel, and perforce he knoweth not what troubleth him.

He humbleth himself upon the earth; yea, he lieth himself down upon his back beneath the vehicle and gazeth up into the mechanism, while the grease drippeth upon his flushed face and soileth his apparel. He tryeth hard to discern that which stoppeth his progress, but he discerneth nothing. He lieth there a long time, and his soul is sore within him. He wondereth why he is cursed with this trouble, and in his meditations he careth not if he were dead that he might be relieved from his present torment.

And as he lieth there and meditateth unto himself that which concerneth the motor car, of what it is and what it is not, he desireth deep down in his heart that he might live at a later time when man shall understand the gasoline engine with a more perfect knowledge.

And as he so pondereth, behold! there approacheth from the highways and byways vast numbers of those who are full of sympathy and advice. Among them two good men—Alphonse and Gaston, who insisteth upon offering all kinds of assistance—but they availleth him naught. Others approach with horses and adviseth concerning the horse, saying that he is strong and that he can be depended upon, which causeth the motorite to utter and speak forth divers blasphemous utterances which cometh from the bowels of his wrath and polluteth the air about him. And as he riseth up in his anger and curseth them to a standstill they all disperseth into the far distance and he is left to take counsel with himself as to the next thing he shall do before darkness falleth upon the land.

Behold! he again stretcheth forth his hand and taketh hold of the crank and turneth one turn, and lo, the motor motoreth and runeth like the devil, and he standeth off to one side and looketh upon the motor as it motes, and sayeth unto himself, "Well, I'll be damned," after which he smileth and proceedeth to clothe himself in his raiment; even in the garments he had discarded, and immediately he is puffed up and forgeteth his trials and tribulations. He proceedeth on his way with a proud and haughty spirit and seeth not his neighbor who saluteth him, and he chideth with a haughty stare the multitude that encompassed him round about when aforetime he was on his back.

Yea, the motor car is likened unto woman, whom man understandeth not but possessest if he hath the wherewithal to do so, and it mattereth not what troubleth him—he sticketh close unto her, even to the bestowal upon her of nine-tenths of his kingdom. Both are fascinating; both are fickle; both take money; both are beautiful with paint and trimmings. Yea, one is like unto the other in that man can learn little of them, and neither are what they seem to be. They constantly needeth fixing. They play with the affections of man and dally with his pocketbook. Who wondereth, then, that man hath said, "When shall I solve this mystery?"





E. H. V. Co.

Compound gasoline motors for automobiles built by this concern have up till the present season been used only in pleasure cars, but during the past fall a delivery wagon using this motor was brought out. The wagon, with a motor rating of 12-15 horsepower, has a load-carrying capacity of 2 tons, weighs itself approximately 1,800 pounds and has a speed radius of from 3 to 15 miles per hour. In the running gear such parts as pressed steel framework, semi-elliptic springs with six leaves, 28-inch wheels, 3½-inch tires, 96½-inch wheel base, standard tread, plain bearings in the road wheels, Shelby steel tubing in the front axle, similar tubing in the back axle, when side chain drive is used, heavier casing for the driveshafts when shaft and level drive is adopted and irreversible steering gear are found. The motor has three cylinders; two high-pressure ones of the four-cycle type and working as do the cylinders on any motor of this class. The third cylinder of the low-pressure type is worked by the exhaust pressure from the two high-pressure cylinders. This cylinder is located between the other two and receives from them the exhaust gases which force the piston down the same as do the explo-



COMPOUND DELIVERY WAGON

sions in the other cylinders. This low pressure cylinder is of great diameter compared with the high-pressure cylinders. Ignition in the high-pressure cylinders is by jump spark with current from batteries. Lubrication is by a mechanical oiler with sight feeds on the dash and which can be adjusted while the car is running. Cooling is by a typical water system in which circulation is maintained by a positively-driven gear pump. The water supply carried is 4 gallons and the gasoline supply 13 gallons. Two quarts of lubricating oil are carried. The sliding gear transmission gives three forward speeds and one reverse with direct drive on the top speed. Either shaft drive, through bevel pinion to a live back axle, or double side chain-drive from a jackshaft to the rear wheel hubs, is fitted. One foot brake working on the driving shaft serves for regular use and a pair of internal expanding brakes working within drums on the rear hubs serve for emergency uses. The latter are lever-applied. Control of the

wagon centers about the steering wheel beneath which are placed on the steering column the spark and throttle control levers. The clutch is released by pedal and at the right are the speed change and emergency brake levers. A pedal applies the regular brake.

Knox Motor Truck Co.

H. A. Knox has introduced many new points in his present truck over that of the past season. Before mentioning these it will suffice to state for the benefit of readers not familiar with the design used in the original truck, that the horizontal two-cylinder water-cooled motor and sliding gear set are carried on the back of the chassis close to the rear axle so that neither shaft nor chain is used in connecting the gear case with the axle, it being geared direct, and that one case contains the crank-shaft, transmission gear and differential, with a mechanical oiler supplying lubricant for the entire outfit. This unit power plant was supported on the rear axle housing and a triangular frame piece, the axle forming the back of the frame part and the two side parts carried by trunnion on the center of the front axle. The body of the truck is then supported through a set of four elliptic springs. Referring now to the changes made in this design, the most important is that the front end of the frame part is now mounted on the front springs so that all the jar of the axle is not transmitted to the machinery plant. The motor, with its pair of horizontal cylinders with 6-inch bore and 7-inch stroke mounted side by side is still rated at 24 horsepower. The gear case gives three forward speeds and one reverse. The side pieces of the frame are 5 inches in depth and reinforced. A 4-inch angle piece is used beneath the motor. The spark lever on the steering wheel is eliminated, the spark now being automatically retarded when starting and running slowly. Wider tires are used, the push rods for the exhaust valves are larger, heavier spring bolts are fitted, the radiator is improved and its method of attachment to the frame changed, and 5/8 instead of ½-inch bolts are used in attaching the gears in the gear case to the shaft flanges. The trucks are made in two styles: A, for a 4,000-pound load, and B, taking 6,000 pounds. The former has an aver-



TWYFORD LIGHT DELIVERY WAGON

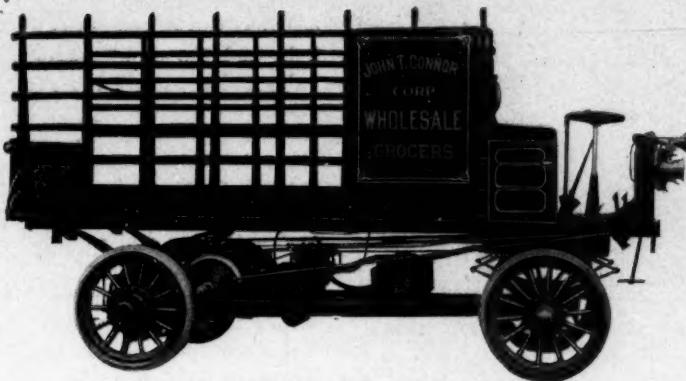
age traveling speed of 12 miles per hour, the latter 10 miles; they weigh approximately 5,000 and 6,000 pounds, respectively, have a fuel consumption of 1 gallon to every 5 to 8 miles and carrying platforms measuring, respectively, 9½ by 5 feet and 11½ by 5 feet. Bodies of the stake side, canopy top or enclosed style are fitted. In this truck all motor and gear parts are beneath the load platform. The cars are made in different styles of bodies, it being the aim of the Knox people to meet the desires of their customers in the way of style and color. Several unique ideas are demonstrated on the stand, which always has a crowd around it.

Lansden Co.

What attracts the spectator most in the electric express wagon exhibited by this concern is the suspending of the battery tray beneath the frame work immediately in rear of the front axle, thus leaving the remainder of the space beneath the frame for carrying the motor and also making room for a jackshaft in front of the motor. The motor suspension is by four spider-like arms from the side pieces of the main frame. Drive is by chain to a jackshaft located crosswise of the car in front of the motor and almost midway of the front and rear axle and from sprockets on the ends of this shaft by double side chains. The chains, because of the jackshaft location, are very long and no attempt has been made at enclosing them. The control of the wagon rests with a vertical steering column in front, fitted with a hand wheel, a horizontal controller handle beneath the wheel and a pedal which operates a pair of expansion brakes, acting on drums within the sprockets on the rear wheels. It is noted that the controller handle is secured to a sleeve surrounding the steering column and through this connects with the controller carried beneath the seat part of the machine. Both axles are straight throughout and made from square steel bars; a pair of semi-elliptic springs serves in front and rear. Heavy artillery wood wheels, shod with solid rubber tires, are used. The top is of the canopy style, with drop side curtains in front, rear and on both sides. Carrying the motor close to the bottom of the frame and using side chain drive gives the wagon a high clearance.

Hewitt Motor Co.

The 4-ton truck shown weighs 5,500 pounds and the 8-inch pressed steel frame sides are chambered and tapered. The engine is placed upright at the front with four cylinders and marine



ATLAS STAKE TRUCK

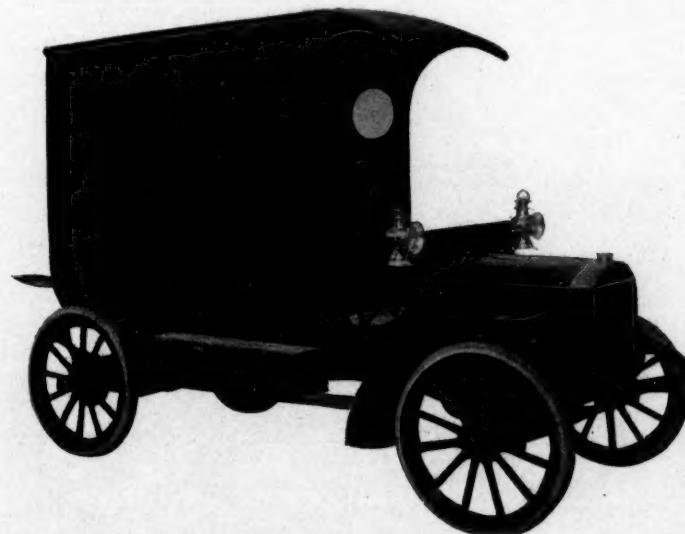
type open crank base. The drive is through a two-speed planetary gear, facing fore and aft, to a differential on the cross shaft with Timken roller bearings throughout. From the cross shaft two side chains run to the rear wheels, which are each equipped with divided solid rubber tires. The tread of the front wheels is 54 inches and of the rear 66 inches. The wheelbase is 10 feet and the carrying platform 12 feet in the clear, the overall length of the machine being 15 feet 10 inches. The driver's seat is arranged so that the driver sits to one side and at the left of the motor, the control being through a vertical steering column and wheel and three pedals, one for each speed, each interlocking and automatically throwing out, when applied, the last speed used. A light delivery wagon is also made with an engine of the same type, but of smaller horsepower, and driving through a cone clutch a three-speed sliding gear and propeller shaft. Up-jump leaves are used on the springs.

Mitchell Motor Car Co.

The one truck shown by this concern is a 12-14-horsepower wagon with a carrying capacity of 1 ton and intended for quick delivery purposes calling for a speed of 20 miles per hour. The motor, a pair of vertical 4 by 4½-inch cylinders, has a rating of 12-15 horsepower and gives its normal power at less than 1,000 revolutions per minute. The pair of cylinders forms an integral casting and has ports on the left in which the mechanical valves are located. The crankshaft throws are set side by side and in balancing the shaft 4¾-pound horseshoe-like weights

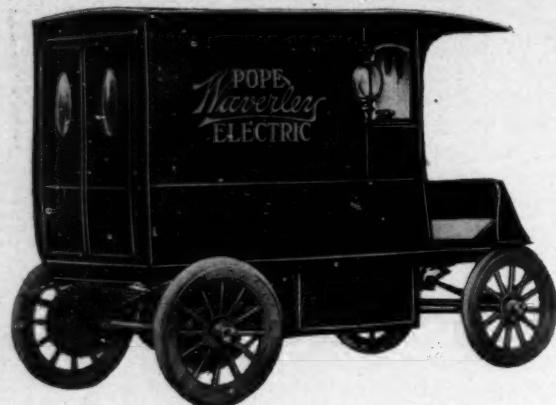
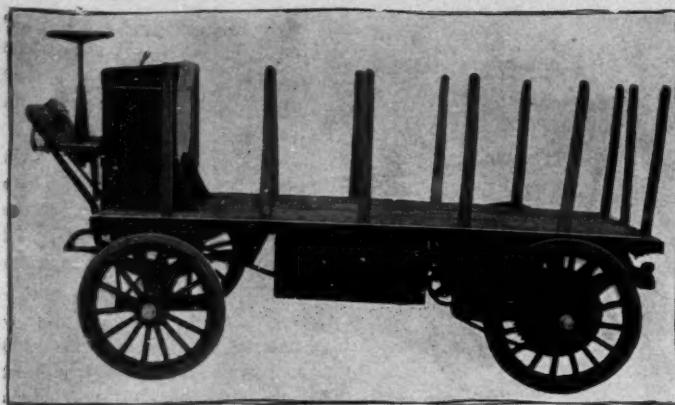


MITCHELL LIGHT TRUCK



MITCHELL LIGHT DELIVERY WAGON

are attached to the throw arms. Parsons' white metal is used in the bearings. Ignition is by jump spark with spark plugs placed vertically in the cylinder-heads and receiving their supply of current through a Splitdorf coil. Current comes from a storage battery. A honeycomb radiator forming the front of the bonnet is used for cooling the cylinders. The regular Mitchell clutch is fitted. Designed on the cone principle with a leather facing contacting with the flywheel surface and having coil springs working beneath the surface of the leather to give easy engagement, this clutch can be considered standard throughout. The gear case of the sliding variety with three forward speeds gives direct drive and high speed by interlocking teeth, at which time the countershaft remains stationary. A few of the points noted in this construction of the running gear are pressed steel side pieces of channel section, 4 inches in depth at the center; subframe pieces for carrying the motor and gearcase; 40-inch



WAVERLEY TON TRUCK AND 1200-POUND DELIVERY WAGON

semi-elliptic springs in front and rear, the latter pair suspended outside of the frame pieces; tubular steel front axle, $2\frac{1}{4}$ inches in diameter with a wall thickness of $\frac{1}{4}$ inch; Elliott type of steering knuckles; 30-inch artillery wheels with 3-inch solid rubber tires in front and rear; 90-inch wheelbase; standard tread and live rear axle with the housings $2\frac{1}{4}$ -inch tubings and the drive-shafts $1\frac{1}{4}$ inches in diameter. Roller bearings are used in the road wheels. The body of typical lines is finished in blue with a yellow running gear—standard Mitchell colors.

Pope Mfg. Co.

Of the four electric commercial wagons exhibited by this company, one is an open delivery wagon well suited for light mercantile concerns; the second is a closed delivery with a load-carrying capacity of 1,200 pounds; the third, a 1-ton truck of the stake variety and the fourth a 3-ton truck with canopy top and drop side curtains. The first model—the open delivery wagon—has a carrying space 5 feet 2 inches in length and 3 feet wide. The carrying compartment in the closed delivery wagon is 5 feet 3 inches in length, 3 feet 4 inches wide and 4 feet 8 inches high. In the 1-ton truck, the load platform has a length of 11 feet 4 inches, a width of 4 feet 3 inches, and in the 3-ton truck the length of this space is 13 feet, the width $4\frac{1}{2}$ feet and the height to the canopy 6 feet. Points to be noted in connection with the open delivery wagon are: The battery contains forty Exide cells; a single motor is suspended on a cross shaft in front of the rear axle and connects with the rear wheels through two side chains; the spring suspension is a set of four ellipitics; tubular axles serve in front and rear; 30-inch artillery wood wheels are fitted with 3-inch tires; steering is through a vertical column with a regulation wheel; the wheel base is 85 inches and the tread 54; and the body follows democrat lines, having a driver's seat of full width and straight leather dash. In the closed delivery wagon forty-two cells of 11 P. V. Exide battery are carried. Propulsion is through a single motor which communicates the power through double reduction gears and side chains to the road wheels. The spring suspension of this vehicle differs from that in the open wagon in the use of semi-elliptics in front. Three-inch solid rubber tires are used on the 32-inch front wheels and 36-inch rear wheels; two hub brakes and a countershaft brake

are fitted; steering is through hand wheel with gear and sector gearing; the wheelbase is 91 inches and braking is through two hubs and the countershaft brake. The body has rear entrance only, and a canopy top projecting over the dash. In the 1-ton truck two motors suspended in front of the back axle take their current from a battery of forty-two 11 M. V. Exide cells and transmit their power through double reduction gears and side chains. Spring suspension consists in a pair of semi-elliptics and a platform scheme behind. Wheels are 36 inches in front, 42 inches in rear and regularly fitted with wide solid tires. The wheelbase is 92 inches. The 3-ton truck is a stout proposition. Its motor and drive scheme is the same as in the 1-ton vehicle, only stronger. Current comes from forty-two 15 M. V. cells of Exide battery; 36-inch road wheels are regularly fitted with 5-inch solid rubber tires; the wheelbase is 112 inches and the tread 6 feet 4 inches.

Studebaker Automobile Co.

In the garden basement are four styles of electric wagons built by this concern, one a heavy truck, two slightly different styles of enclosed delivery wagons and the third, the feature of the group, a light truck with lattice sides and a stake tailboard. All of these are alike in that the battery trays are carried beneath the main frame work, midway of the front and back axles. They are also alike in the use of Firestone solid rubber tires of varying widths, and further agree in that semi-elliptic springs are used throughout. A little difference is noted in that in the light truck and the delivery wagons these springs are shackled in standard form, whereas in the large truck they are bolted at one end to a spring hanger, and at the other end the two longest leaves are shaped into a small loop, through which passes the bolt from the framework that serves in attaching the spring. This construction gives the same result as sliding blocks. Referring particularly to the light truck, a point not to be missed is that the two motors, of the barrel type, are carried in the rear of the back axle and take their support from the frame pieces through a pair of A-shaped brackets that are pivoted at their apexes to a cross shaft carried on the side frame pieces. In the rear of the motors is a jackshaft and from this drive to the road wheels is by forward extending side chains to large sprockets on the rear wheels. For chain adjustment, radius rods, with turn-buckle adjustment, extend between the rear axle and the motor countershaft. Braking is through two sets of brakes; one set of the band type, working on the countershaft, and the other made from the footboard. In this car wagon steering is through a hand wheel on a vertical column and a pinion and internal sector gearing. The controller handle is at the left of the seat. Angle frame pieces and Lemoine type of steering knuckles are fitted. In the smaller enclosed delivery wagon a similar motor outfit is on the internal expanding principle, operating within drums within the rear wheel sprockets. Both sets are pedal-applied carried in front of the back axle, a bit of design resulting in a longer wheelbase as well as a bigger carrying compartment. This



DURYEA LIGHT DELIVERY CAR



RAPID DELIVERY WAGON

wagon is guided by a horizontal steering lever connected by a horizontal arm with a cross rod, secured to the right steering knuckle through a rear arm on the knuckle. The tie rod connecting the knuckles passes in front of the axle. In the larger enclosed delivery wagon the motors are carried behind the back axle and steering is through a hand wheel and pinion and internal sector gear. The large truck, the heavy service wagon of the group, is guided through a hand wheel, and arm connection with the steering knuckles serving instead of a steering gear.

Duryea Power Co.

Novelty characterizes the 12-15-horsepower delivery wagon exhibited by Charles E. Duryea as much as it does his pleasure vehicles. The three-cylinder Duryea motor in which the cylinders are mounted at an angle is carried beneath the driver's seat and drive from it is through an adaptation of planetary gear and single chain to the center of the back axle. Characteristic one-lever control is used and the load-carrying capacity is from 750 to 1,000 pounds. The body has been designed for light delivery work and care has been taken to make it as easy as possible to enter and exit from. To gain this the front part of the body is made low and in the rear of the vertical radiator in front is a small parcel-carrying compartment, so that the footboard is well in rear of the front wheels. The bottom of the driver's seat is made on a level with the bottom of the rear carrying compartment, so the seat cushions practically rest on the floor of the vehicle. The footboard is placed correspondingly lower. It is because of this that entering is so much facilitated. Beneath the floor of the carrying compartment is a large parcel-carrying space and above it is the main carrying compartment. The top of the carrying part is low and an arched canopy is necessary to protect the driver, a feature which gives the body part a novel appearance. At either side of the seat are large oval windows so that cross streets and objects to the side can be easily seen. Pneumatic tires are used on front and rear wheels. A touch of Duryeaism is seen in making the rear wheels much greater in diameter than the front. The body gives throughout the impression of adaptation, not being fashioned for appearance's sake, but made to obtain good carrying room and ease of access.

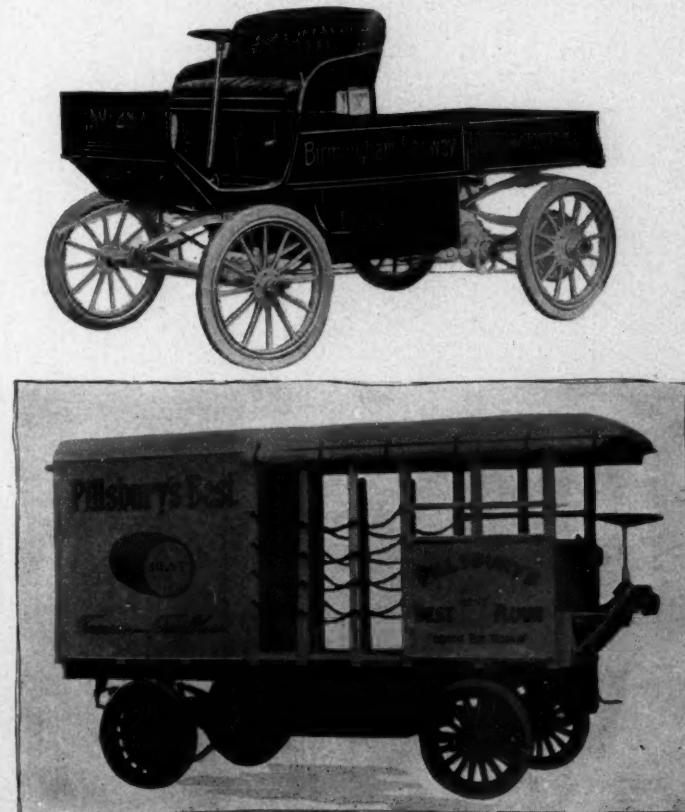
Vehicle Equipment Co.

Of the six styles of electric wagons exhibited by this New York concern the smallest is a $\frac{1}{2}$ -ton enclosed delivery wagon; the second a 2-ton truck with wire sides and canopy top; the third a 3-ton truck with canopy top and stake sides; the fourth a 5-ton hoist truck and the fifth and sixth enclosed delivery wagons with paneled sides and load capacities ranging from 2,000 to 3,000 pounds. In all of these machines the battery is carried in a separate tray beneath the frame and midway of the front and rear axles. In reviewing the chief points of each machine separately, the light delivery wagon has the motor carried in front of the rear axle and gears direct to a large gear ring on the wheel, the drive thus being direct as is the case in all but one of the other models. The same motor suspension serves throughout,

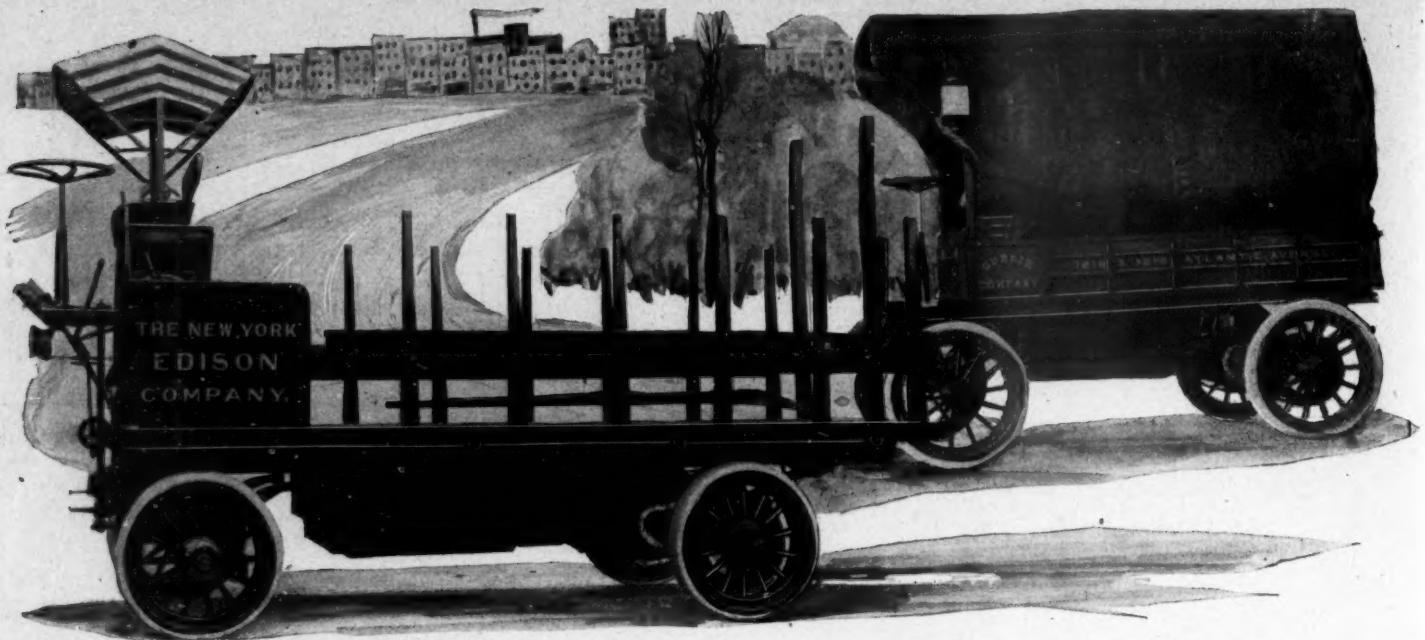
larger motors, of course, being used in the larger vehicles. In all of the machines, with the exception of the 5-ton truck which has five speeds ahead, the motors have four forward speeds and two for reversing. The wheel base in the light delivery wagon is 89 inches; wheels regularly 36 inches in diameter with 3-inch Firestone tires in front and $3\frac{1}{2}$ -inch tires in the rear. Steering is by horizontal lever. The channel steel frame is supported on a set of four elliptic springs. Rear entrances are used only in the body, which has a canopy projection over the driver and drop curtains at either side of the seat. The 2,000-pound delivery wagon uses $3\frac{1}{2}$ and 4-inch tires in front and rear. Other points connected with it are lever steering, one expanding foot brake, channel steel frame, 101-inch wheel base, body with rear entrances, scroll windows at either side of the driver, leather dash, chain drive and suspension through four elliptic springs. The 3,000-pound closed delivery wagon differs from this in that it uses $3\frac{1}{2}$ and 5-inch tires and gear drive. The three heavy trucks are gear driven; have vertical steering columns with hand wheel attached and driver's seat the full width of the body. In the 2-ton machine, 5-inch tires front and rear are used, and two brakes, one an electric and the other foot-applied, are fitted. The 3-ton machine has 6-inch tires in front and those in the rear 7 inches wide. In the 5-ton wagon, 7-inch tires are used in front and rear. This wagon has a wheelbase 134 inches long and a $69\frac{1}{2}$ -inch tread.

Commercial Motor Car Co.

This concern's heavy 3 to 4-ton truck, built after the design of Arthur J. Slade, uses as its power plant a four-cylinder Brennan motor, in which the cylinders are placed horizontally in pairs on the opposite sides of the crankshaft, the whole unit being carried over the front axle. The motor rating is 30-40 horsepower. All motor fittings, such as mechanical oiler, jump spark ignition from storage batteries, throttle and spark control, and waterjacket construction, is standard. On the truck exhibited a large size of radiator, of the tube variety, is carried in front of the dash and extends from below the axle to the top of the dash. In transmitting power a disk clutch is the first element used. It consists of three disks, one fixed to the flywheel and the other two connected with the shaft. A cone is used in



WAVERLEY LIGHT WAGON AND 3-TON TRUCK



COLUMBIA 3-TON TRUCK

COLUMBIA ELECTRIC DELIVERY WAGON

forcing the disks together and in disengaging the clutch, instead of a small pedal being used, a cross rod, almost equal in length to the length of the foot board, serves to allow the driver to operate it with either foot. The gearbox is carried close to the clutch. It gives three speeds ahead and one reverse and all are obtained on a clutch principle. All gears are constantly in mesh, but are mounted loosely on the gearbox shafts. Speed changes are made through a single lever. A short propeller shaft transfers the drive to a jackshaft. Final drive is by side chains. In the footboard is a push button acting on the throttle and on the dash is a small spark lever. The tires used are of the multiple variety, the rear ones consisting of five solid round tires of $1\frac{1}{2}$ -inch diameter, placed side by side, and held in place by the metal flanges. These miniature tires are compressed into oval sections when the flanges are tightened. In addition to the flanges a series of cross bolts, passing through the tire parts, holds the tire in position. The local-carrying platform is 6 by 12 feet and is supported, as well as is the power and transmitting plants, on a channel iron frame work, in which the side pieces are offset alongside of the motor.

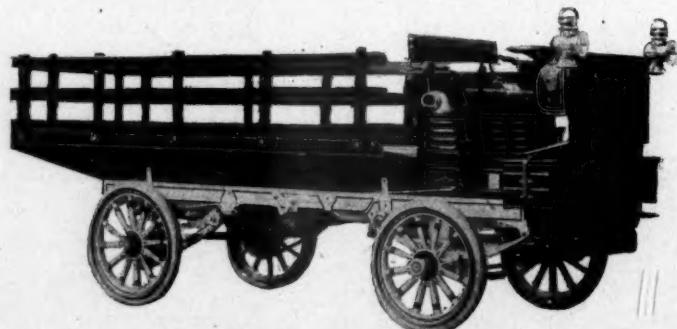
Acme Motor Car Co.

As in many other light delivery wagons, the motor with its accompaniments, the clutch and sliding gear set, are taken from the touring cars. To these, however, are added a stronger frame construction, heavier running gear, solid rubber tires and heavier driving mediums. Among the features in the running gear specially made for the commercial sphere are: Side frame pieces of channel section 4 inches in depth at the center; a channel-section subframe for carrying the motor and gear sets; front and rear stationary axles in the form of square drop forgings, $1\frac{1}{2}$ inches to the side; 34 by $3\frac{1}{2}$ -inch solid rubber tires on the front and rear wheels; both sets of wheels running on roller bearings, and four semi-elliptic springs, the front pair $3\frac{1}{2}$ feet long and those in the rear 2 inches longer. The motor is two separately-cast vertical cylinders with a bore and stroke of $4\frac{1}{8}$ and 5 inches and a combined rating of 16 horsepower at 1,000 revolutions per minute. Both sets of valves, made interchangeable, are placed in ports on the left side of the cylinders, with the exhausts in the bottom of the ports and the automatic inlets in the tops. There is jump spark ignition with current from storage battery or dry cells, and a water-cooling system including in it a tubular radiator carried beneath the dash. There are also a gear-driven pump and throttle and spark control. A governor on the throttle is used. A leather-faced cone clutch serves as a flexible connection with the sliding gear set and is operated by a pedal. In the gear set direct drive is not used, owing to the

power leaving the gear box from the rear end of the countershaft through a bevel pinion meshing with the bevel gear on the differential carried on a cross jackshaft. Double chains transmit from the jackshaft to the two rear wheels. The sliding gear set gives three speeds ahead and one reverse, all obtained through a horizontal lever working on the steering column beneath the steering wheel. Mounting the seat of the wagon above the motor and using a low dash for carrying the coil and other points parts, give a medium length of wheelbase, but of course correspondingly lessen the carrying compartment. Using three doors to reach the enclosed carrying compartment not only produces a neat body design but gives three instead of one openings to take packages from, a feature for such delivery work as department stores where a great many small parcels are carried. Solid rubber tires are used. The driver's seat is the width of the body and is protected by drop side and front curtains.

Electric Vehicle Co.

The display of commercial vehicles of this concern comprises two electric delivery wagons and an electric 3-ton truck. The delivery wagons are of 1,000 and 2,000 pounds load capacity and the truck has a load rating of 3 tons. Referring to this truck, the body is of the side stake variety with a long load-carrying platform. Two electric motors are carried in front of the rear axle, and the motors are connected through a countershaft with the rear wheels by side chains. In the motor suspension, a pair of triangular brackets carrying the armature shaft is pivoted to the main frame and radius rods to the back axle serve for chain adjustment. The battery, enclosed within a heavy tray, is carried in the usual place beneath the framework and midway of the axles. Spring suspension in a truck of this load-carrying capacity calls for many-leaved half-elliptics in front, pivoted at their forward ends to a stub springhanger and working at the



PACKARD TWO-CYLINDER GASOLINE TRUCK

rear in sliding boxes. The back springs work in sliding boxes at both ends and are carried on the top of the axle. Heavy artillery wheels shod with broad solid rubber tires are fitted. By throwing the operator's seat well to the front and using a footboard supported on the front of the body part, by a bridge-like framework, practically none of the carrying space is taken up by the driver. A vertical steering wheel is mounted on the footboard and has all of the steering connections in front of the framework and exposed throughout. The controller is carried beneath the seat with the handle at the seat end. The delivery wagons follow in general the same design except that a platform spring suspension is used in front and rear, that the countershaft for chain drive is to the front of the motor and that the platform is raised extra high by the use of brackets beneath the frame pieces which serve in the capacity of spring hangers. Bodies are of the canopy top style with the complete allotment of the storm appurtenances and flaring sideboards. The driver is fully protected and a portion of the carrying platform of the car serves for a footboard. Wheel steering through a vertical column is used. Band brakes are fitted on the countershaft.

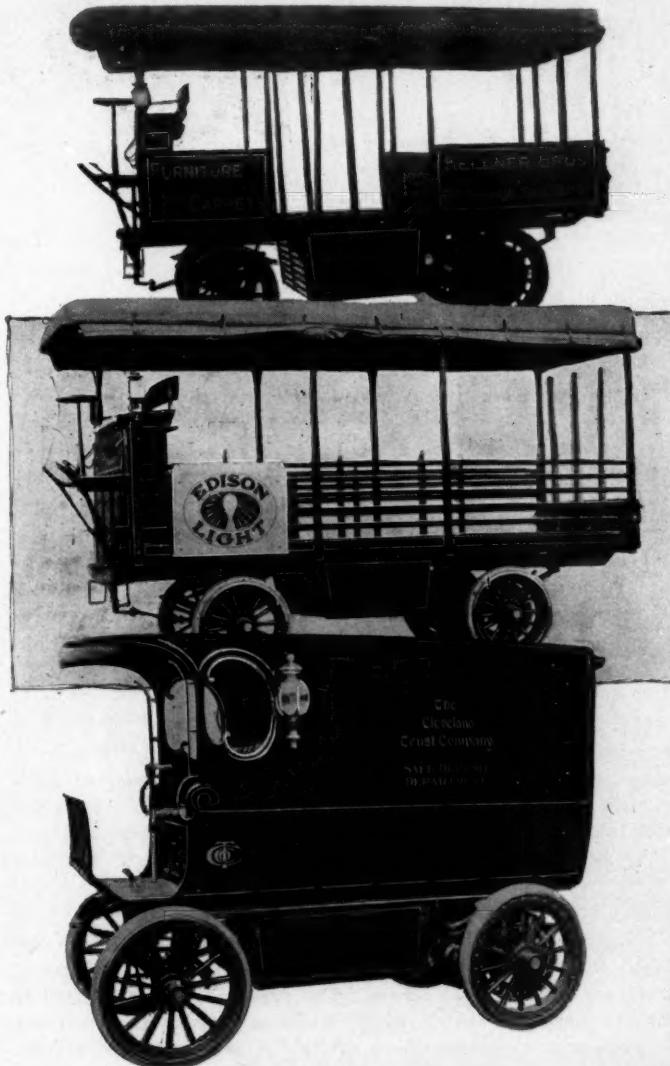
Iroquois Iron Works

A large fourteen-passenger gasoline stage exhibited by this concern follows recognized lines of construction from radiator to rear seat. It is, in short, a stoutly-made pleasure car with all such parts as motor, gearcase and running gear made very much stronger, and a special body design with four cross seats facing the front, each having accommodations for four passengers added. The design employed is that of placing a 55-horsepower water-cooled motor vertically beneath a bonnet in front and transmitting from this through a clutch, three-speed and reverse sliding gear set with differential jackshaft, contained in the rear of the case, and thence through side chains to the rear wheels. Its running speed with load is placed at 15 miles per hour, which, however, can be increased from 18 to 22 on good surfaces. Points connected with the motor are individually-cast cylinders with 6-inch bore and stroke; ignition by a Remy high-tension magneto; mechanical valves; regulation water system including water pump with radiator forming the front of bonnet and water-jackets made integral with the cylinder castings. In the gearcase all gears are cut from chrome nickel steel and are made with $1\frac{1}{4}$ -inch face and No. 5 pitch. Changes in speed are through a single side lever. One and one-half-inch pitch Whitney chains are used, as are 2-inch Timken roller bearings for the rear wheels. Such heavy constructions as 5-inch channel side pieces serving the main frame; very long semi-elliptic springs 3 inches wide; 36-inch wheels, those in front shod with $4\frac{1}{2}$ -inch solid rubber tires and 5-inch similar tires on the rear and heavily forged spring hangers are not unexpected. Control of the machine consists in a good arrangement of levers, pedals and finger levers grouped conveniently around the steering column. The body is regularly fitted with a canopy top carrying front, rear and side drop curtains. The body finish and upholstering is the same as in the ordinary touring car and good baggage-carrying facilities are furnished beneath the seats and other places.

Packard Motor Car Co.

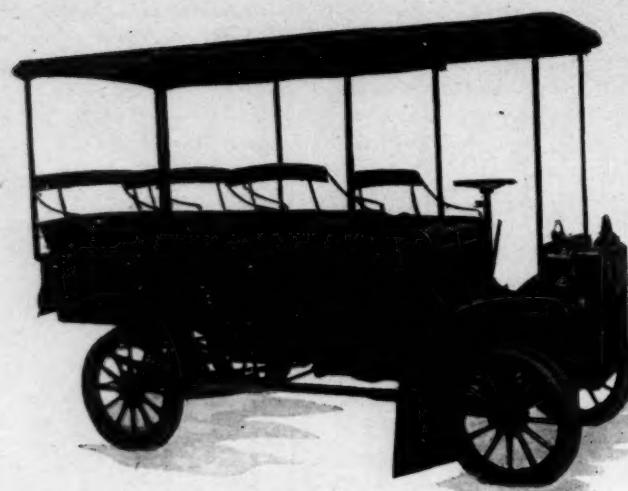
Leaving well enough alone is the motto of the Packard concern with reference to its 1½-ton truck for the present season. This truck was brought out early last spring and since then has literally walked into popularity. It is not an experiment as far as design is concerned, in that Packard car parts are used almost exclusively. The motor at 14 horsepower has a pair of the touring car cylinders carried vertically beneath the car seat; in the motor flywheel is the expanding clutch used in the touring car; back of this is the three speed and reverse gear set, but from this a change over pleasure car design is found in using a jackshaft and having the drive by double side chains, this being necessary to get proper speed rates of 3, 8 and 12 miles per hour as needed for commercial work. This general outlay of parts has not been molested for the 1906 truck. Let it be noted in passing that the radiator is of the horizontal tube variety, carried in

front beneath the footboard, and that on the dash is a water tank which supplies the radiator. The steering wheel is on a vertical column and couples through worm and segment gear with the front road wheels. Mounted on the column are the two horizontal gear shifting levers, one for the three forward speeds and another used in reversing. The back axle, of the stationary variety, is made from solid forged steel and measures $2\frac{1}{4}$ by $2\frac{1}{4}$ inches, whereas the front axle is a weldless steel tubing fitted with drop forged steering knuckles. Armored wood, heavily reinforced at the corners, is used in the frame parts and in the spring suspension is combined a pair of semi-elliptics in front and a platform scheme in the rear. Viewed specially from a commercial vantage point the following details are of importance: Front and rear wheels with a diameter of 32 and 34 inches, respectively, are shod with $3\frac{1}{2}$ -inch solid rubber tires; in the oiling system is combined a forced feed splash system in the crankcase with a

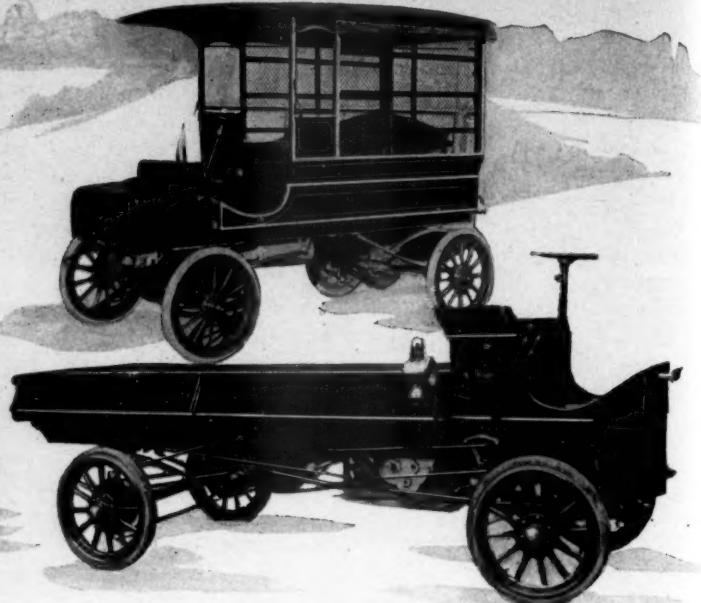


THREE OF THE VEHICLE EQUIPMENT CO.'S TRUCKS

bath system in the gearbox and differential; double and triple ballbearings carry the shafts in the gearbox; roller bearings carry the front wheels; the steering knuckles work on ball bearings; rollers are used for the rear wheels and a set of four brakes are fitted; two regular band brakes pedal-applied working on the rear wheel drums and two emergencies expanding within the same drums. In controlling the truck all pedals and levers are well concentrated around the driver. The spark lever is on the steering wheel, an accelerator pedal is placed at the base of the steering column, the change speed levers are on the steering column and the emergency brake at the driver's right. Tank capacity for 8 gallons of gasoline, 7 gallons of water and 2 quarts of oil is provided, and all the way through there is every indication that the Packard people have given as much care and attention to the



LOGAN TWELVE-PASSENGER BUS



LOGAN DELIVERY WAGON

LOGAN HEAVY TRUCK

construction of their trucks as they do to their pleasure cars. The bodies are turned out in several styles and the finish is most attractive on all the rigs that are on display.

Logan Construction Co.—Logan

Of the three styles of Logan commercial wagons, the undoubtedly leader is the 2-ton truck, which gets its power from a 30-horsepower double-opposed water-cooled motor carried lengthwise beneath the center of the body. The two cylinders have each a bore and stroke of $5\frac{1}{2}$ and 6 inches, respectively, and the rated power is produced at normal motor speed. From the motor power is taken through a two speed ahead and one reverse sliding gear transmission, and from this by a single chain to a jack-shaft, from which the transmission is through double side chains. The running gear possesses such features as I-beam solid axles in front and a solid square section in the rear. Timken roller bearings for the road wheels, 100-inch wheel base, $56\frac{1}{2}$ -inch tread, 32 by 4-inch solid rubber tires on all wheels, and bodies built specially to order have $9\frac{1}{2}$ feet of carrying platform in rear of the driver's seat with an average width of 6 feet. Motor lubrication is by a positive force feed oiler, jump spark ignition with current from dry cells is fitted, a gasoline capacity of 15 gallons and a similar water tankage is furnished; three contracting brakes are included in the general equipment, and a speed of from 1 to 10 miles is possible. The truck weighs approximately 2,500 pounds. A full set of elliptic springs is used. Steering is through hand wheel on a vertical column with throttle and spark levers beneath the wheel. Changes in speed and the application of the emergency brakes are through side levers. The passenger bus exhibited is a twelve-passenger vehicle with four cross seats facing the front and each accommodating three adults. A canopy top with drop, side, front and rear storm curtains is attached. This model is driven from a motor of typical Logan lines, from which power is taken through a two speed and reverse sliding gear transmission and single chain to the center of the back axle. Controlling parts are almost identical with those in the truck, except that the side levers are at the end of the footboard. The horizontal tube radiator used carries thirty-two finned tubes and is supported in front of a straight dash and has a compact box-like water tank above it. Entrance to all of the seats is from the side, and to assist in this are used a running board and individual steps to each seat. The novelty, however in this exhibit is the air-cooled 1,000-pound delivery wagon in which the motive power comes from a pair of opposed cylinders placed crosswise in front beneath a bonnet. In cooling the motor circular copper flanges are used around the cylinder walls, radiating flanges are provided on the cylinder heads and valve cages, and the top

of the crankcase is left open. Inserted in it is a large copper hopper with a wire screen across it. This hopper retains the oil in the case, but permits hot air to escape; in short, it allows of separate air circulation within the crankcase. A fan is used. Drive from the motor is through the standard Logan sliding gear set and from this by a very short propeller shaft to a jackshaft and from this by single chain to the center of the back axle. Control in this little wagon is standard, with steering through an inclined column. The usual brake equipment is furnished. A canopy top wire-sided carrying compartment is fitted, with storm curtains attached. Suspension is through a set of elliptic springs.

Rapid Motor Vehicle Co.

A twelve-passenger bus, a twenty-passenger bus, a 5-ton truck, a take-down delivery wagon and its regular $1\frac{1}{2}$ -ton delivery wagon comprise the group exhibited by this concern. In the last mentioned wagon double chains are fitted in driving to the back axle in place of single chains previously used. Next to this change the general use of manganese bronze in different parts of the machine is conspicuous. Such parts as bearing surfaces for revolving shafts, crankcase supports, steering axles and connecting rods and brackets for carrying the jackshaft are made from this metal. Two opposed horizontal cylinders compose the motor used. These have a bore and stroke of 5 inches. The general motor design is meritorious in that it is built from the bottom up and permits of dissembling from the top downward. This calls for such points as the push rods lying along the tops of the cylinders and the valves housed in ports on the tops of the cylinder heads. The crankcase being split horizontally in line with the crankshaft bearings and the cylinders bolted to the bottom half of the case as well as to the top part permit of the pistons, connecting rods and crankshaft being removed without interfering with the alignment of the cylinders and the crankcase. The top of the crankcase is a large inspection plate carrying the camshaft and push rods so that when it is removed the crankshaft, connecting rods and pistons are exposed. This motor is, in short, very accessible, as well as possessing that all-important feature of easy dissembling and assembling. The planetary gear set affords two speeds ahead and one reverse, with direct drive on the top speed. The case is mounted to the right of the crankcase with its shaft in line with the crankshaft and the drive sprocket is mounted between the crankcase and the motor flywheel. Transmission is first to a jackshaft just in the rear of the motor, and thence to the road wheels. On the jackshaft is carried the differential within the sprocket that receives the drive from the gearshaft. The jackshaft is carried on adjust-

able end bearings, the bearing cages being suspended in bronze brackets with removable bottoms so that the shaft can be removed from the chassis frame without taking off the drive chains. Steering is through a hand wheel and pinion and internal sector steering gear, enclosed in a dustproof bronze case. Bodies for this wagon are made with wire sides and broad dropping tail-board. The canopy top has drop side and rear curtains and a protection for the driver. Tires are 32 by 3-inch solid rubber in front and rear, the wheel base is 90 inches and Timken roller bearings are regularly fitted in all of the road wheels.

Detroit Auto Vehicle Co.

This concern has previously been known as a maker of a two-cycle delivery wagon, which vehicle, however, has been discontinued and in its place is adopted a new delivery model driven by a pair of vertical water-cooled cylinders working on the four-cycle principle. The motor is standard throughout with drive by chain to a planetary gear set. The motor, two-cylinder opposed, is placed crosswise in front, beneath a bonnet. The friction drive has these characteristics: On high speed drive is absolutely direct by shaft to live rear axle, with one universal joint about midway of the propeller shaft. Mounted on the shaft is a sliding friction wheel. Like the majority of rigs in the commercial department this wagon is handsomely finished and attracts considerable attention.

Olds Motor Works

The Olds eighteen-passenger wagonette, a canopy-topped, winged express wagon, a special delivery wagon design and a chassis intended for heavy uses comprise the commercial exhibit of this pioneer Michigan concern. In the first vehicle, the passenger wagonette, a novel seating arrangement is used. The driver's seat extends across the car, another cross seat backs it, still another cross seat faces this one and behind these three cross seats is a pair of facing side seats reached through a rear entrance. The tonneau part seats eight passengers and if occasion demands it the seats can be removed and a platform substituted for carrying baggage or freight. The motor generates 18-20 horsepower and has two vertical cylinders with 5 by 5-inch measurements. The cylinders are placed beneath the driver's seat and drive is through a jackshaft and side chains. Timken roller bearings are standard equipment, the wheelbase is 108 inches, 30 by 4-inch Firestone tires are used and a speed as high as 20 miles an hour is possible with an average running rate of 10-15 miles per hour. For express, baggage and general transfer work the winged express wagon is specially designed. Like the passenger wagonette, its motor is a pair of vertical water-cooled cylinders carried beneath the driver's seat and having a 16-18

horsepower rating which is capable of giving an average speed, with load, of 10 miles per hour and a maximum speed running as high as 18-20 miles when necessary. A two-speed and reverse planetary transmission is carried beside the motor and from it drive is through chain to a jackshaft and thence to the rear wheels by side chains. The carrying capacity measures 97 inches in length, 48 inches wide and has side boards 12 inches high, carrying wing boards 4 inches wide. In wet weather side, rear and front drop curtains can be used on the canopy top. The wheelbase is 108 inches. The special delivery car for loads up to 2,000 pounds has an enclosed style of body, with rear entrances and canopy over the driver. Its motor power of 16-18 horsepower is furnished by a set of vertical 5 by 5-inch cylinders placed vertically beneath the seat. From it drive is through a planetary gear set, jackshaft and side chains. The carrying compartment is 70 inches long, 58 inches wide and 71 inches high and a railing on the top of the compartment serves for carrying light parcels in emergencies. As in all of the other commercial machines, the radiator is a large tubular construction placed vertically in front and forming the dash, having, of course, on the rear side a large tank. Steering is through an inclined column and hand wheel and surrounding the driver is a full equipment of levers and pedals for changing the speeds, applying the regular and emergency brakes and controlling the spark and throttle. In the chassis exhibited a set of semi-elliptic springs is fitted, the front pair being shackled at both ends and the back pair working in front and rear sliding blocks. A set of spiral springs is also fitted in front. The entire gear plant is enclosed by a leather apron suspended from the chassis frame at either side.

Knox Automobile Co.

In its desire to give the business man as near as possible what he is seeking this concern has for the present season as its leader a 3-ton truck which it is difficult to recognize as being a member of the well-known Knox make. This, however, holds true only as far as appearances go and the critic quickly discovers that the 16-20-horsepower air-cooled motor with a pair of 5 by 7-inch cylinders, opposed to each other and carried lengthwise beneath the center of the body, remains, as does the planetary transmission. But to stop here and glance at the general design of the truck, it is noted first of all that the drive from the transmission is first to a cross jackshaft carrying the differential. From this shaft it is by side chains to the rear wheels. The mounting of the end bearings of the jackshaft in ball and socket cages which are adjustably secured to the side pieces of the frame, should be



OLDS
EIGHTEEN-PASSENGER
WAGONETTE

OLDS EXPRESS WAGON

OLDS COMMERCIAL CHASSIS



TWELVE-PASSENGER WAGONETTE

AUTO-CAR EQUIPMENT CO.

LIGHT GASOLINE TRUCK

noted. The cage hangers themselves are not rigidly fastened to the frame side pieces but have a slight backward and forward adjustment. To the side pieces of the frame are riveted castings with supports for two parallel horizontal bolts, the upper one of which is cotter-pinned in position. The lower has a screw threaded into the bearing hanger and by it the entire bearing, with the jackshaft, can be removed to the rear or front in adjustment. Apart from the changes in appearance consequent upon the use of side chains, the next point to attract is the semi-elliptic spring suspension. The front pair is conventional throughout, but the rear pair, made 50 inches long, contains many leaves and works at both ends on trunnions within sliding blocks. The blocks are heavy castings bolted to the side and bottom parts of the frame pieces. The slides are made of hardened steel. Both axles are strong. The front one, 4 inches deep and $2\frac{1}{2}$ inches wide, is made in I-section, whereas the rear is a solid axle steel forging $2\frac{1}{2}$ inches square. Timken roller bearings are used in the road wheels. It would not do to neglect the introduction of a steering wheel mounted vertically in front. At the left of the seat is a vertical pillar with two horizontal levers on top, one for controlling the spark and throttle and the other taking care of the high and low-speed clutches on the transmission. Other controlling features are two pedals for the reverse speed and the regular brake. To the left of the footboard is a vertical lever for the emergency brakes which operate in the rear hubs. The carrying platform of the car in the rear of the driver's seat is 12 feet long and 5 feet 6 inches wide. The speed range runs as high as 12 miles per hour.

Maxwell-Briscoe Motor Co.

One style of 1,000-pound delivery wagon and its light truck built by the company are on exhibition. Those familiar with the Maxwell pleasure cars will remember that the power and transmitting parts are enclosed in a unit casing carried on a three-point suspension in the front of the chassis. This casing contains a 16-20-horsepower motor formed with a pair of 5 by 5-inch opposed cylinders placed crosswise. A multiple disk clutch connects the crankshaft with a sliding gear set, giving three forward speeds and one reverse. The final drive is by shaft and beveled gears to the live rear axle. This power plant is used in the company's delivery wagons but in the running gear many features embodying greater strength are used. In the framework pressed steel is generally used, as are semi-elliptic springs, 32-inch wheels; $3\frac{1}{2}$ -inch tires in front, 4-inch tires in rear and tubular axles. The use of the shaft for final drive is not general in commercial wagons, but this concern claims, after continued tests, that as good success is obtained from it as is given by the side chains.

Two universal joints are used in the shaft and in the rear axle. Hyatt roller bearings take the place of the ball bearings used in the pleasure cars. Any side thrust caused by the bevel gear construction in the rear axle is taken up by a blank roller of the same size as the driving pinion. This bevel is fitted against the smooth bevel surface of the driving gear, holding the latter up to its work and rendering false alignment difficult. A glance over the bearings fitted in the different parts of the machine shows that plain babbitt is used in the transmission gear, bronze with a babbitt lining for the motor crankshaft, and Hyatt rollers in the rear axle. The body design of the truck includes a very wide carrying platform, the measurements of which are $10\frac{1}{2}$ feet in length and 6 feet wide. The extra width is obtained by having the body cross sills extend over the road wheels. A comparatively narrow seat which does not infringe on the carrying space is used. The delivery wagon body follows orthodox lines and affords carrying space for an 800-pound load. The road wheels are 30 inches in diameter and carry $3\frac{1}{2}$ -inch pneumatic tires.

Auto-Car Equipment Co.

One of the models of this concern shown is a twelve-passenger wagonette. This car is equipped with an 18-horsepower double opposed horizontal motor, mounted crosswise on the main frame underneath the body, making the parts needing attention accessible without the necessity of getting under the car. The transmission is of the planetary type, having two speeds forward and one reverse. The jackshaft is driven by bevel gear, gears enclosed in an oil-tight housing. Double chain drive is employed, running from the jackshaft to sprockets attached to the rear wheels, the sprockets being cast integral with the brake drums. The car is but 9 feet 6 inches long. The body is plain but neat and has a removable sash which can be taken off in summer time, making it practically a canopy-topped vehicle. This company's 3-ton gasoline truck has been solely designed for commercial uses, a fact which is most apparent from the heavy construction used throughout. The framework made from seasoned oak has the sills 7 inches wide and $2\frac{1}{2}$ inches thick. These, with the cross pieces, which are mortised in place, are armored all around with steel plate 6 inches wide and 3-16 inch thick. The carrying compartment measures 10 feet in length, 5 feet wide and 6 feet from the floor to the canopy top. In looking over the running gear it is noted that both axles are solid steel hand forgings, made $2\frac{1}{2}$ inches square; drop forgings comprise the steering knuckles. Steering is through a vertical pillar with gear and quadrant steering gear. The motor of the accepted vertical four-cylinder type with the cylinders cast in pairs and a positive water cooling system connected. Thirty-four horsepower is generated at normal

speed. Such features as jump spark ignition, float feed carburetor, mechanical valves and throttle and spark control are adapted. Transmission is through an orthodox clutch and a three-speed and reverse sliding gear transmission, which gives a direct drive on the top speed. In the rear of the gear case is a differential jackshaft $1\frac{1}{2}$ inches in diameter. Drive from this shaft is through a pair of Whitney roller chains. Ten miles an hour is the accredited speed with load. The body has a top of the stationary type which is fitted with heavy duck storm curtains and a front storm shield. In the body part is a drop tail gate with chain and two side gates are added for convenience. For hotel use this concern builds an electric omnibus which is driven by a pair of Westinghouse motors suspended beneath the frame and each driving through a chain to a rear wheel. Current is furnished by forty-four cells of 13 M. V. Exide battery.

McCrae Motor Truck Co.

The 4,000-pound electric express wagon exhibited carries its battery beneath the car floor and takes its power from a pair of motors located beneath the body from the main frame. Transmission is through reduction gears to a countershaft and thence by side chains. The front and rear springs are of platform design. The framework is of heavy channel sections. Solid rubber tires are used. Control is through a hand wheel, with the controller lever at the left of the seat and the pedal for applying the expansion brakes within the rear hubs. A canopy top is used. The motor is carried in a pivotal support, making chain adjustment through radius rods easy. The lock switch is designed to prevent theft or the use of cars when left standing by operators. It is not a switch with a lock attachment but a switch capable of being operated only by a plug to close the circuit. Combinations innumerable are made so that switches are never duplicated. Each switch must have its circuit-closing members operated by its specific plug. Those who have experienced trouble resulting from meddlers investigating on their own hook view this lock with interest.

Pope Mfg. Co.

This is one of the many new commercial cars at the shows. It is unique in having a two-cylinder opposed motor carried low in front above the front axle. The cylinders are water-cooled with circulation through the jackets and a very large vertical tube radiator by a gear-driven pump. The radiator pipes are cooled by copper flanges, and a wire netting in front of the radiator acts as a slight protection. Drive from the motor is through a clutch, regular transmission and jackshaft, and thence by double side chains. Using a horizontal motor, leaves the entire truck platform for load carrying. The driver's seat is carried

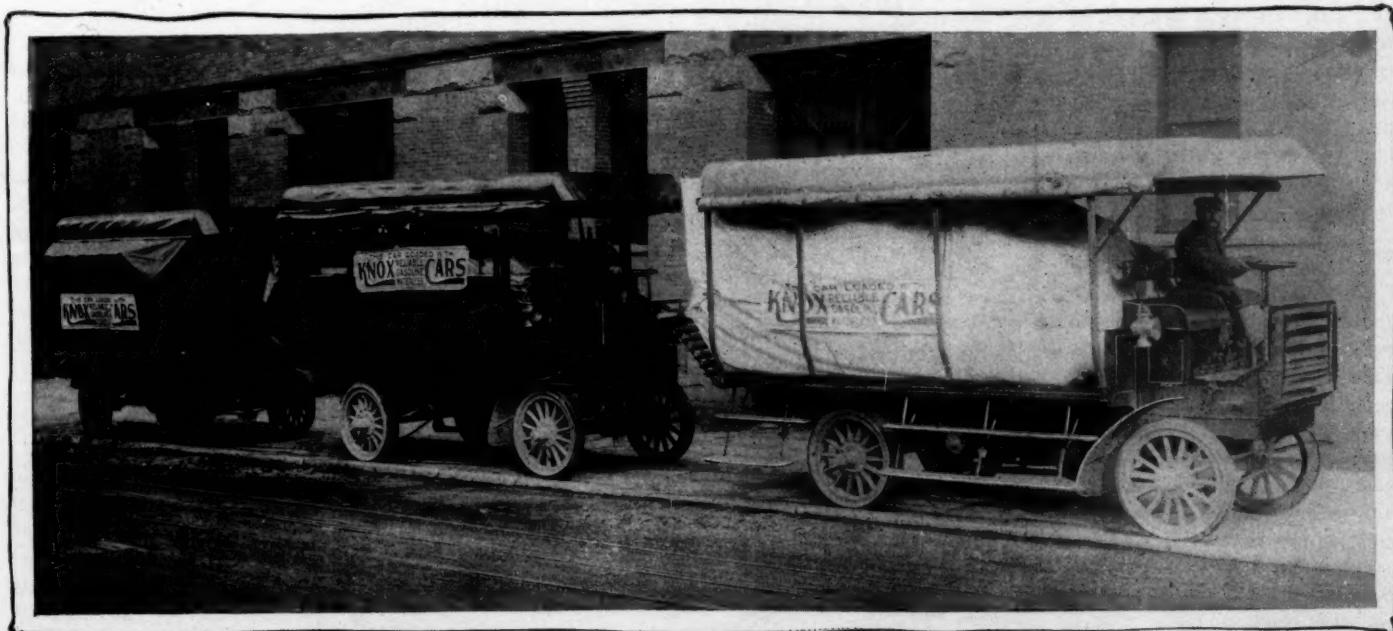
high above the motor and the gasoline tank is beneath the seat. Motor construction follows general lines, with mechanical valves, float feed carburetor and jump spark ignition. Two frameworks are used; one fairly narrow carrying the motor and gear box and the second, a couple or three feet wider, supports the carrying platform, which extends over the road wheels to the ends of the hubs. This frame is an H-section piece, straight along the sides and bent at the front corners, so that one piece forms the two sides and front of the frame. Heavy running gear parts, comprising two platform springs, solid steel axles and artillery road wheels with solid rubber tires are used. Control is through a rope-wound steering wheel, with motor control levers located on the steering column, the regular side levers for gear changes and the regular pedals for operating the clutch and brakes.

H. H. Franklin Mfg. Co.

The Franklin model G air-cooled touring car has been commercialized, its counterpart motor and gear plants being mounted on a heavy running gear and the completed whole styled the Franklin light truck. The motor, with four vertical air-cooled cylinders, rated at 12 Franklin horsepower, is carried lengthwise in front, and the seat platform is above the motor, a bonnet not being used. This places the seat very high and gives the truck an out-of-the-ordinary appearance. Beneath the seat is the gasoline tank. The front of the body ahead of the motor is in the form of double screen doors, hinged at the sides, and which are opened in examining the motor. Side doors afford extra facilities for examining the motor. Drive is through the newly introduced Franklin multiple disk clutch to a sliding gear set arranged with three forward speeds, and final transmission is by a universal shaft to the live rear axle. The wagon has a large carrying platform with neither sides nor tailboard. In the running gear, axles, springs, wheels and framework are stronger than in the pleasure cars. Solid rubber tires are fitted. Control of the car is through a vertical column with hand wheel, and the accepted clutch and brake pedals and change speed and emergency brake levers.

Pittsburg Motor Vehicle Co.

A 1,000-pound delivery wagon, equipped with solid rubber tires, and having a radius of 35 miles at 11 miles per hour speed is shown by this concern, which has evolved a creditable looking rig which has a battery equipment of 24 cells, 11 M. V. exide battery. Drive is through single chain to the back axle from a Westinghouse electric motor, which is conveniently located.



KNOX TRUCKS LOADED WITH KNOX CARS FOR EXHIBIT AT MADISON SQUARE GARDEN



Diamond Rubber Co.

Particular attention is given the truck equipment question in the exhibit of solid tires by the Diamond Rubber Co. The side wire type is given prominence, but a new solid tire, having what is known as a wire mesh base, also attracts attention. One of the advantages of this tire is that it can be attached to the wheel without the aid of machinery. The regular Diamond wrapped tread detachable clincher tires are a notable part of the Diamond display. The outward appearance of Diamond wrapped tread tires for 1906 is little different from those of 1905, although close inspection shows reinforcements and special toughness of the tread. The exhibit also includes some distinctly new things, among them the Diamond flat tread tire. This is of the regular wrapped tread construction, with an extra thick tread made perfectly flat. The extra thickness of the tread tends to prevent slipping and skidding. The diaphragm tube, a tube within a tube, is another new thing. If the outer tube is punctured the inner or emergency tube can be inflated without removing the tire from the wheel. The outer tube can be repaired in the usual way and made to serve again and again. The interior tube is for emergencies only. The Burnham tire protector consists of a heavy shoe of rubber and fabric much resembling a tire casing without the beads or clinchers by which a tire is secured within the rim. The shoe is placed over and around a worn tire and when the latter is inflated the shoe is held immovably in place. In effect this protector amounts to a tread which can be removed or applied at will. The leather covered tire and the Bailey Won't Slip tire are also exhibited, together with various sundries for pneumatic tires.

William Cramp & Sons Co.

Just how prominent a part manganese bronze enters into the construction of an automobile is demonstrated by the Cramps, who show castings and ingots of Parsons' manganese bronze, castings and ingots of Parsons' white brass, rolled and extruded Parsons' manganese brass rods, and sheets and castings of Cramp's special bearing bronze. White brass bushing castings are used by the Packard Motor Car Co., Continental Motor Mfg. Co., George N. Pierce Co., Dorris Motor Car Co., the F. B. Stearns Co., the Northern Mfg. Co., the Premier Motor Car Co., and the Winton Motor Car-

riage Co. are among the users of axle castings made of Parsons' manganese bronze. Samples of goods made for these firms are also exhibited, as well as manganese bronze castings used by a number of others prominent in the trade. Manganese bronze is claimed to be the strongest of all the bronzes and the Cramps guarantee its tensile strength to reach 65,000 pounds per square inch; its elastic limit 30,000 pounds per square inch; its elongation 20 per cent in 2 inches, and its reduction area 25 per cent. This metal is designed to take the place of steel castings and from it are made gear wheels, brackets, wheel hubs, sprocket wheels, transmission cases, cardan crosses, friction plates and spur, bevel and miter gear wheels. White brass castings are used as a bearing metal, it being applied to automobile construction in the form of bushings instead of by melting and pouring it into boxes.

E. J. Willis Co.

One of the features of the stand of this New York concern handling supplies is the Auto Log, which combines a speedometer, odometer and a special trip odometer. The odometer registers up to 10,000 miles and the special trip register goes to the even century. This latter device has a set-back which puts the trip register to 0 by pressure on a button. In addition there is a speedometer which only registers the pace. A tool chest designed to fasten to the running board of an automobile and which can also be used as a step is shown. Among the other things are a Yankee grade meter, 1 and 8-day clocks, H. & M. automatic spark plugs,

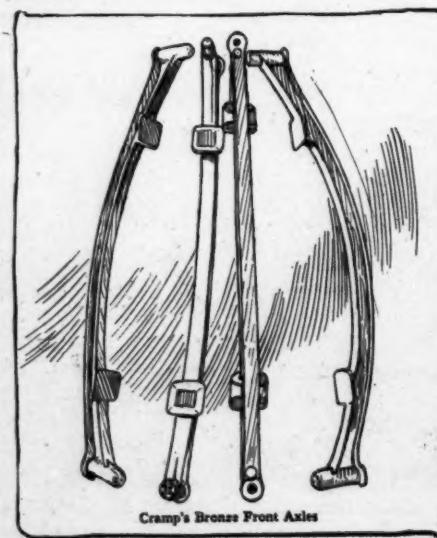
Yankee muffler, Yankee cut-out switch, which can be used on two sets of batteries or separately, Yankee mica spark plugs in two styles and two styles of siren horns. The horns are operated by flexible shafting, the power coming from the flywheel. An automatic shut-off is a feature, the horn being operated through the pressure of a foot button.

Mitchell Punctureless Pneumatic Tire Co.

On a Rambler car is shown the Mitchell punctureless tire and there is also a wheel with the outer flange removed so that the construction of the tire can be studied. With the Mitchell tire an inner pneumatic tube, which is much thicker than usual, rests on a steel rim which rests on the felloe. Between the inner tube and outer tire are rubber legs, held in place by a metal clincher, through the sections of which they play freely. The legs overlap at the ends, presenting a continuous surface. The outer tire is of practically the same construction as the ordinary make of pneumatic tires and rests on the legs about 3 inches above the inner tube. The whole is enclosed at the sides by steel flanges, which are bolted together, the bolts passing through the clincher, holding the tire firmly. When the weight of the car comes on the tread of the outer tire the rubber leg is forced upward and compresses the inner tube. The resiliency resulting from the motion is claimed to be free from all elements of friction.

Utility Co.

Several useful specialties make up the line of this New York concern—Gre-Solvent, Squeal-skin tire band, Utility mica spark plug, Utility raw silk wipers and Triple-P compound being the leaders. As can be told by the name, Gre-Solvent is a compound for dissolving and removing from the hands machine grease, grime, paint or printers' ink. It is antiseptic and is declared to be "miles ahead of soap." The Squeal-skin tire band is made of selected Spanish hog skin and comes in handy when the casing is cut or torn. One Squeal-skin is shown which had been used for 11 weeks in which time the car covered 1,200 miles. The band is pliable like a glove. The spark plug has India mica insulation, two platinum contacts, and a solid brass head which gives an air-tight fit and is declared to be rust-proof. The Triple-P compound, a puncture-proof preservative.



consisting mainly of cactus juice and asbestos fiber, is designed to heal punctures and cure porosity in single tube tires. There is also a multiple switch with detachable plug connection which can be installed in short order. Either or both sets of batteries can be at short notice used with this switch. It is also asserted that it is impossible to short circuit batteries when this device is used.

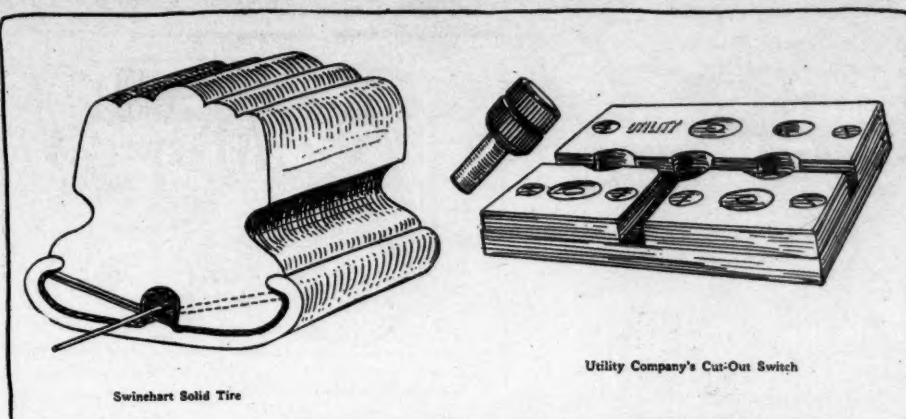
National Sales Corporation

The Geecee battery contains an electrolyte which consists of a white, spongy but not gelatinous mass which retains the moisture and not only acts as a separator but is also non-spilling. The plates are made of a new alloy and the containers of a fiber. The Geecee charging outfit can be hung in any position—on the wall, ceiling or table. With this outfit goes the Polefinder, a novelty which simplifies the finding of the negative or positive pole. The Polefinder is a strip of yellow paper which when soaked in water will print the negative pole red when two wires of any current are pressed upon the wet paper. This prevents a layman charging his battery in the wrong direction. The Geecee charging outfit is made to be used with a 110 or 220-volt direct current.

The soot-proof spark plug is also shown. This plug is made with a double air space designed to aid in keeping the plug clean and to prevent short circuiting. In putting the plug together a copper-asbestos gasket is used, which permits the parts being drawn well together and at the same time allows them to be taken apart with ease. The plug is supplied with a terminal for attaching the secondary wire so as to do away with the necessity of removing the nut. At this stand also is found a full line of the coils made by the Connecticut Telephone and Electric Co., a description of which appears elsewhere, and the well known Dodge lubricator.

Swinehart Clincher Tire & Rubber Co.

With the addition of a line of truck tires this company now has types of solid clinchers for every style of vehicle from the runabout up, with 28 by 3 inches for the runabouts to 6 inches for the trucks. All these are shown. The Swinehart is made to fit standard clincher rims. It



Utility Company's Cut-Out Switch

has concave sides and corrugated tread and the cross wire system of fastening wires to clincher rims is used. The advantages claimed are that the Swinehart does not skid, rides much easier than pneumatics and is better adapted to light commercial service. One of the features of this exhibit is a section of a tire which covered 16,000 miles of Chicago streets on the Knox runabout of Dr. Schroeder. The tread of this section of tire is only worn down about $\frac{1}{4}$ -inch after this long service. Greater resiliency than ever is claimed for the new models put out by the Swinehart people for the 1906 trade.

Edmunds & Jones Mfg. Co.

Automobile lamps in all sizes and styles are the specialties shown by this Detroit concern, models 70, 71 and 72 being particularly prominent. Model 71 is used with a separate generator and is fitted with a lens mirror searchlight reflector. Size G in this line is $10\frac{1}{2}$ inches long, 10 inches high and with a $\frac{3}{4}$ -foot burner. Model 70 is of the bullet type, with parabola lens and removable burners. It is finished in full polished brass and can be fitted with a lens mirror reflector if desired. The searchlight is fitted with a mirror lens reflector and is credited with covering a wide field of light. In addition the company has a full line of side and tail lights.

Sheddan Mfg. Co.

New on the market, the air cushion shock absorber of the Sheddan company

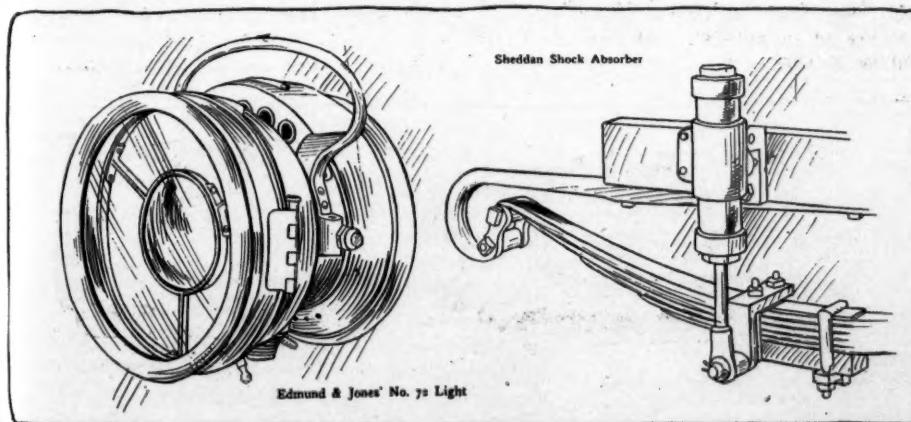
attracts attention from those who have come to consider a device of this nature part of the ordinary equipment of an automobile. This shock absorber consists of an air chamber enclosed at both ends and secured to the side of the car by a bracket. A double acting piston inside the chamber is made rigid with the piston rod, which in turn is pivoted at its lower end to a stud projecting from a bracket attached to the spring of the car. When in action and the car drops into a rut the jar is eased by the air chamber being forced down on the air cushion above the piston. When an obstruction is met the frame portion is prevented from rising by the air cushion beneath the piston. As the piston is constantly working up and down between air cushions, one of the latter is compressed whenever the other is expanded.

Continental Caoutchouc Co.

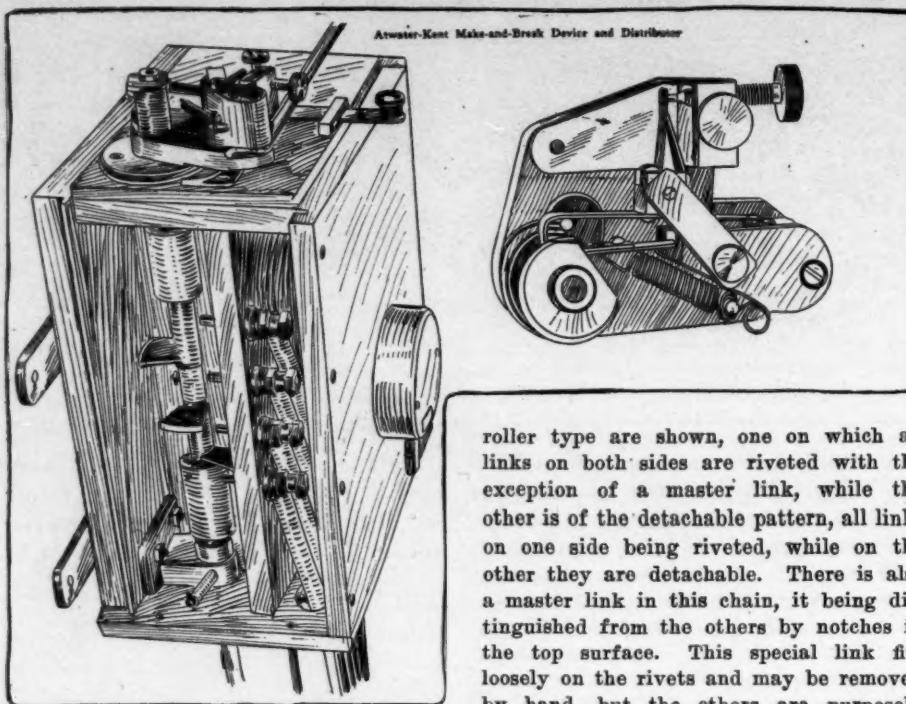
The American branch of the Continental Caoutchouc & Gutta Percha Co., of Hanover, Germany, displays the full line of Continental tires, the feature of the exhibit being a new steel-studded non-skidding tire which stands as the company's latest production. It is constructed entirely without leather, a departure from the usual method, in which the casing is either covered with leather or has a strip of leather set into the tread into which the studs are fastened. The new style of Continental is a heavy tire especially constructed with heavy walls and tread. Over this is an extra heavy tread with many layers of strong Egyptian cotton canvas. This protects the carcass of the cover and the inner tube from the steel studs, which are held firmly in place by being vulcanized into the material of which the outer tread is made.

Wheeler & Schebler

The well known Schebler carburetor for 1906 is much the same in form as that of the past season, but the interior construction has been somewhat altered, the carburetor now having a balanced throttle, an attachment for use with a governor. The throttle consists of a drum sliding horizontally within the gas passageway. One end of the drum is open



Edmund & Jones' No. 72 Light



roller type are shown, one on which all links on both sides are riveted with the exception of a master link, while the other is of the detachable pattern, all links on one side being riveted, while on the other they are detachable. There is also a master link in this chain, it being distinguished from the others by notches in the top surface. This special link fits loosely on the rivets and may be removed by hand, but the others are purposely forced tightly on the rivets. For the purpose of removing these links to make repairs the company has a repair outfit for inserting new links in a chain in the shape of a clamp in which one side of the link rests against a short lug and at the same time a pair of prong-like punches operated by a hand lever and a cam action forces the rivets out while the link is held rigid against the lug.

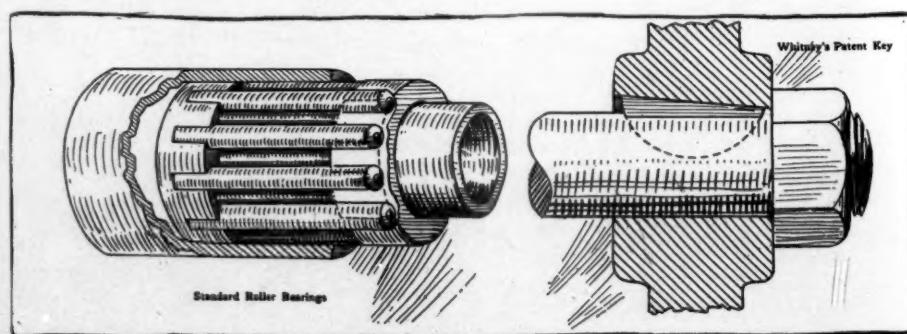
Atwater-Kent Mfg. Works

A new spark generator without timer and without vibrator is what this company ranks as the chief portion of its exhibit. It does, however, show a new switch and a timer. The mechanical vibrator is the chief feature of the new generator and is designed to take the place of both the commutator and the ordinary vibrator on coils. It resembles in some ways a make-and-break device. It has two platinum contacts, one on the end of an adjusting screw and the other on the side of a spring. The latter is carried by an elbow lever which is pivoted below, a spring normally keeping the platinum points apart. A vertical shaft which operates this spring through a cam on the top has four notches resembling the notches on a ratchet. As the shaft revolves it carries forward over the top a

small steel piece which is termed a lifter. The forward movement of the lifter brings a spiral spring in tension. There is no connection at the platinum contact while the lifter is going forward, but when it is released from the ratchet the spiral spring brings it back to an original position. When the lifter starts on its backward path it raises the controlling spring, which in turn makes a contact at the platinum point. This closes the primary circuit. Before the lifter reaches a relief position it permits the controlling system to fall, thus breaking the circuit and producing a spark at the plug. When another notch on the shaft comes round this operation is repeated, making one spark for each explosion in the engine. The generator connected with this device has the secondary wires in the coil box, on the top of which is the mechanical vibrator. This portion of the box also contains a non-vibrating coil. Contact is made from the secondary of the coil to the vertical shaft distributor. The vertical shaft is connected with the two-to-one shaft on the motor and drives the distributor and also the mechanical vibrator, which is connected to a lever to be used for advancing or retarding. The current enters the mechanical vibrator by sliding contacts, which allows advancing or retarding without moving wires. As the vertical shaft revolves the distribution of the secondary current takes place when the extensions pass in close proximity to the plug extensions, to which are connected the secondary wires. The combination of the mechanical vibrator and generator is simple and makes the wiring problem considerably less complicated than the ordinary spark system.

Republic Rubber Tire and Shoe Co.

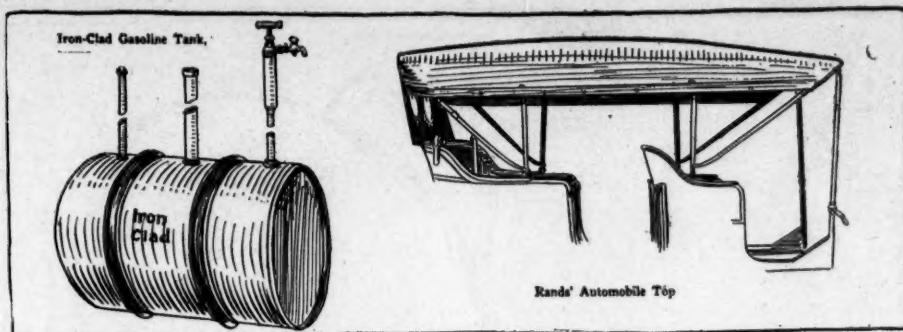
The Hercules non-skid leather cover and tire protector is on exhibition. There is also a new line of rubber non-skid covers. The non-skid leather bands are endless and vulcanized to the upper portion of the tire. These bands are made from a wide strip of leather which entirely envelopes the tire, on which a heavy band of leather is securely riveted with from three to five rows of heavy non-skidding steel rivets which project from about $\frac{1}{8}$ to $\frac{1}{4}$ inch above the leather band. This band and cover is then fitted with a protecting strip of leather and asbestos between the



and the other is closed, so that with the drum occupying a position close to the carburetor casing the passageway to the motor is closed. In the other end of the drum are openings so that the gas can escape to the motor. The balancing feature of the throttle consists in having the casing surrounding the drum slightly larger than the drum, so that the gas leaves the drum through the openings all around it, and the drum as a consequence is not bound in the passage, as it would be if the gas all escaped through an opening in one side of it. The auxiliary air valve and the central spray nozzle are retained, but improvement is found in the construction of the hinge for the float and also in the strength of the valve operated by the float to control the supply of gasoline. A number of samples of each size of carburetor made are on exhibition.

Whitney Mfg. Co.

Illustrating the Woodruff patent system of keying, the attendants at this stand are kept busy showing just how easy it is to fit a key by this method. By means of this system the operation of reducing the diameter by the depth of the key-seat is dispensed with and the thread may be cut to the full size. A pulley or gear splined on an angle makes the union with the shaft secure, the key not rocking in its seat, but adjusting itself to the angular spline which gives a bearing throughout its entire length. In the same manner the pulley may be secured at any position on a vertical shaft without a shoulder and without collars. There is also a milling machine for cutting key-seats under the Woodruff system. The spindle head is counterbalanced and is operated vertically by means of a rack and lever. An adjustable stop is provided for gauging the depth of the cut. In chains two of the



rivets and rubber portion of the tire and is then vulcanized to the body of the tire.

Standard Roller Bearing Co.

A comprehensive display of roller and ball bearings especially designed for use in automobile construction is displayed by this company. Thrust bearings of both rollers and balls are made by this company. Many of the roller bearings are made with the rollers of good length and supported in tubes, the carrying tube fitting inside the roller carrying part. The roller thrust bearings are made with a series of small rollers set in line with the center of the ring, so as to prevent binding or twisting. A form of thrust bearings made is by having the collars grooved, with the retaining ring made in the usual form. The exhibit includes all sizes of plain, roller and ball bearings for almost all purposes in automobile construction and machine shop use.

New York Sporting Goods Co.

This house exhibits a complete line of the Marchand horns, the Tritone whistle, Golden Stag spark plug and Sunlyte lamps. The last named are fitted with Bausch & Lomb mirror lenses and have heavy front doors and rear covers. The lamps are in a number of sizes, including a searchlight with swivel bracket for use on automobiles and boats. The Tritone whistle is made of three pieces of heavy brass tubing and is operated by the exhaust through the use of a cut-out valve. In addition to the articles named the company exhibits brackets for carrying tires and also voltmeters.

Rands Mfg. Co.

Formerly this concern was known as the Wheeler Mfg. Co., whose home is at Detroit, Mich. It exhibits two styles of the 1906 extension top, one being made to be held down by straps, while the other is furnished with side joints. Various styles of top coverings in popular goods are shown, in addition to the completed tops which are set up.

International A. and V. Tire Co.

Clincher and single tube International tires are shown. The internal cushioned construction is the feature of the clincher. This is designed to prevent friction between the plies of fabric which is claimed

to prevent separation of fabric plies, blistering, rim cutting, bead stripping or breaking. Between the tread and the fabric is an elastic cushion of soft pure Para rubber. A soft cushion also separates the various layers of fabric. The rim used in connection with these Fox brand tires has a specially constructed bead, which is elongated at the toe and stiffened in the center. This bead seats itself firmly and the inner tube pressure holds it in its place. This is asserted to be the solution of the rim-cutting problem. In addition the pressure from within on the bead furnishes sufficient leverage to hold the tire and bead in the rim seat firmly. International tires being circular and the same in form whether inflated or deflated and because of the elongated bead, they do not lift at the bead toe, thus preventing the inner tube being pinched.

Iron Clad Mfg. Co.

This concern manufactures a line of gasoline and oil tanks designed both for storage and shipping purposes. The gasoline tank, designed to be placed under ground, is made from extra heavy galvanized steel and is provided with three pipes running to the surface of the ground, one for vent, one for filling and the other attached to a gasoline pump. The tanks are made with heavy iron hoops for strengthening purposes and have seamless ends. They are made and exhibited in a number of different sizes.

Hendee Mfg. Co.

In the Indian motor cycle manufactured and exhibited by this concern the motor has been increased from $1\frac{1}{2}$ to $2\frac{1}{4}$ horsepower and the increase in power has made it necessary to construct the machine so that $2\frac{1}{4}$ -inch tires may be used. This will

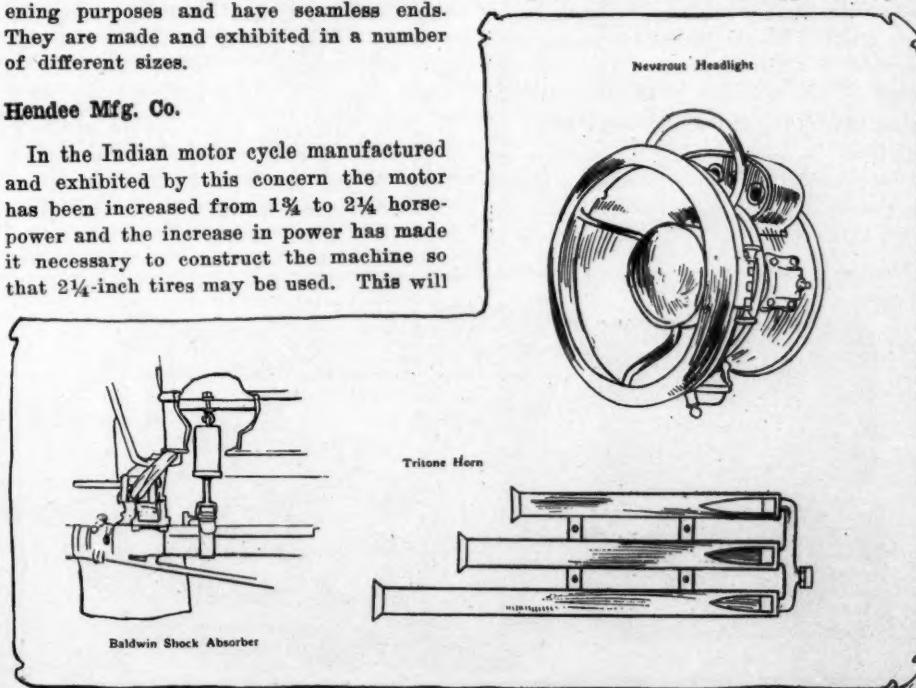
be the standard size for 1906. The machines on exhibition shows some slight improvements, one being a neat gasoline shut-off and another a muffler cut-out. A new scheme has been added whereby the spokes on the driving side of the rear wheels are so placed at the hub that it is not necessary to remove the sprocket in order to replace a broken spoke. A well finished and nicely upholstered passenger side attachment is exhibited, in addition to a tri-car attachment, forming a delivery rig. The Indian motor cycle also is fitted with a tandem attachment, so that this, with the side attachment, makes it possible to carry three people. With all the attachments shown the Indian outfit can be made up so as to form practically six distinct machines.

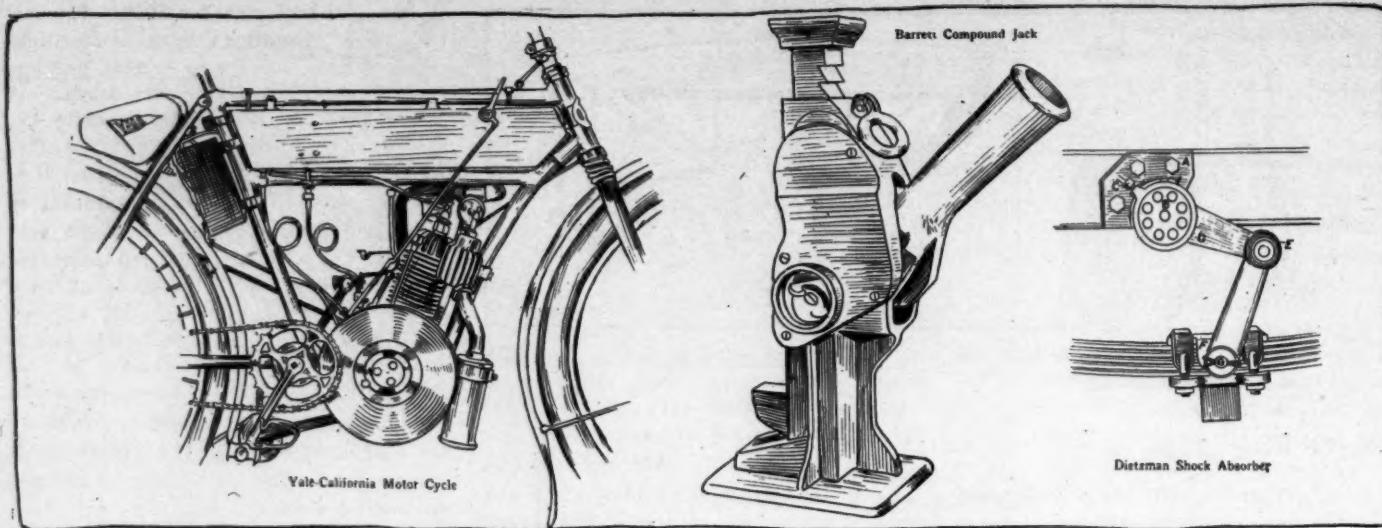
Springfield Auto Top & Upholstering Co.

This concern occupies a large space in the basement of the garden and exhibits a number of tops showing the new features for the coming season. Samples of tops in rubber, mackintosh, pantasote, and leather with bows of ash or mahogany and others leather covered are exhibited. Some of the prevailing styles are indicated here by the bend of the bows and character of the coverings for tops. Side, rear and store curtains of material the same as the top are now fitted with larger celluloid lights than heretofore. Improvement is evidenced in the matter of top making, particularly in trimming and in the fastening devices.

Uncas Specialty Co.

This is a concern from Norwich, Conn., which manufactures automobile specialties. The exhibit consists of samples of distributors, timers, a new muffler and siren horns. The timer is made for any number of cylinders, the contact point being of hardened steel supported by a





spiral spring within a small barrel, which is made adjustable. The body of the timer is of metal with hard rubber for insulating purposes. A metal cap is fitted to protect the working parts from dirt.

Duff Mfg. Co.

Barrett compound lever jacks of all sizes and a new model of the single-acting type are manufactured and exhibited by this concern. The single-acting jack operates on the downward movement of the lever only, the upward stroke being free. The manufacturer makes one claim for superiority in that whatever may be the movement of the lever the body of the car can in no manner interfere with its movement. These jacks are made and shown in a variety of sizes, not only suitable for automobile use but for use in railroad work as well.

A. R. Mosler & Co.

This exhibit consists of a complete line of Spit-fire plugs of all sizes, samples of a specially-made case in which to carry plugs, the Mosler timer and distributor, a ball friction connection and a transparent dashboard ignition outfit. The Spit-fire plugs for this year are made with fiber and mica protectors and others with stone insulators. A special plug for marine use is also exhibited. Interest centers chiefly in the transparent dashboard ignition device, inasmuch as all the working parts of

the ignition apparatus are within sight of the operator and at the same time are enclosed and protected from weather and dirt. This outfit consists of a primary interrupter and a secondary distributor. The distributor is so made that in advancing or retarding the spark the high tension wires remain stationary, the terminals being in sectors, bearing directly against the terminal in the distributor. The sectors are of such length as to permit the spark to be advanced and retarded without the terminals passing beyond the ends of the sectors. The wire from the batteries connects with the binding post on one end of the glass case, a wire connecting through this with the primary winding of the coil. The other end of this winding connects through a contact at the back of the case, so that the current passes through a fixed sector, also arranged on the back of the case, and from this sector through a brush post to the four segments of the primary interrupter. From these the current goes to a grounded shaft and returns through the metal on the car to the battery, thus completing the primary circuit. The secondary winding has one terminal grounded through this same post and the other connects with a brass strip, the upper end of which is supported by a hard rubber bracket on the back of the case. A flexible arm from this bracket carries the current through a central terminal of the distributor. This

arm is hinged at the end which connects with the bracket and can be swung away from the center of the distributor so that with the case locked, it is impossible to start the motor.

Hatch & Brittin.

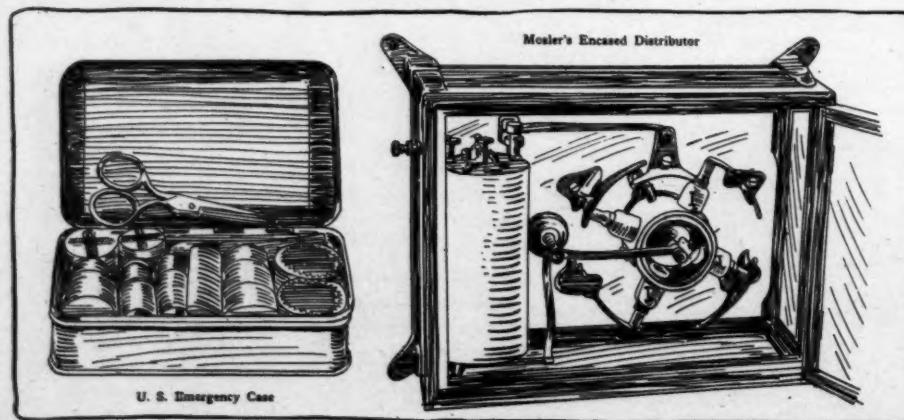
A little out of the ordinary is this exhibit, which shows emergency cases made by the United States Emergency Co. With one of these cases a motorist is almost as well fixed as if he had a doctor in the seat next to him, for in it are packed surgical supplies of all sorts, designed as a first aid to the injured. In it are found everything needed in case of accident—bandages; antiseptic dressing; antiseptic lint; absorbent cotton; ointment for burns, sunburn, sores and skin affections; arnica for bruises; adhesive plasters; aromatic spirits of ammonia for exhaustion and sinking spells; soda mint tablets for heartburn and indigestion; waterproof liquid plaster; a pair of scissors and a paper of safety pins.

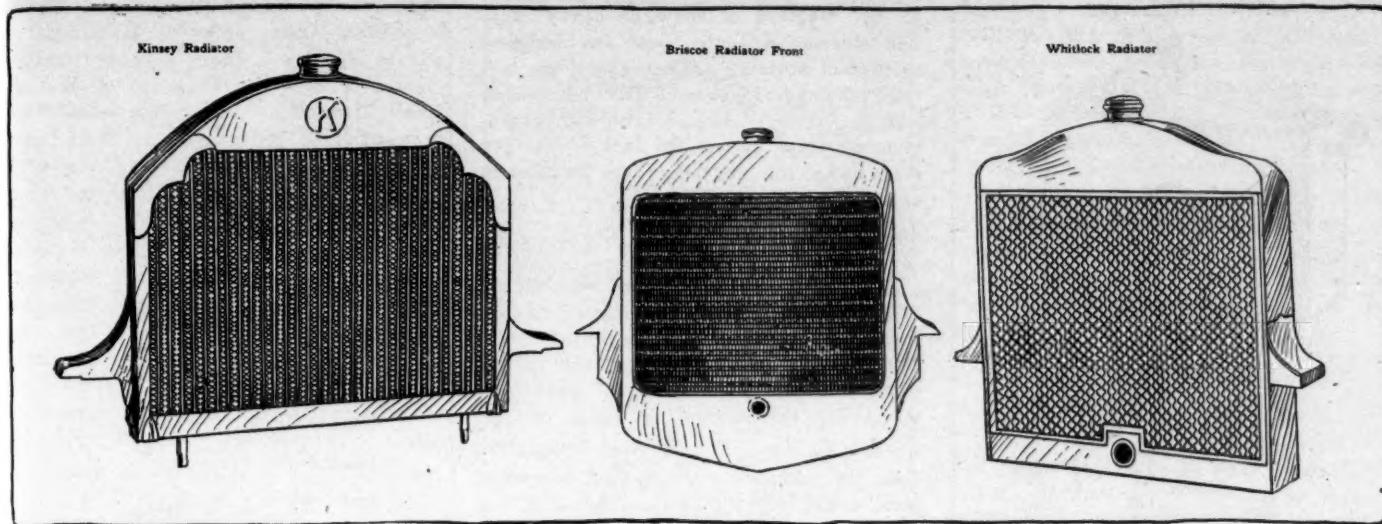
Oliver Mfg. Co.

The Peerless jack, exhibited here, works at any angle and can be used for pushing or lifting. Working the handle below the center raises the object, while above the center lowers it. Five sizes are shown, 15 being for cars weighing up to 2 tons, while 16 and 18 are for heavier machines and have low brackets and also low handles where a high handle is not desirable. For trucks and for general use in garages 21 and 23 are made.

Diezemann Shock Absorber Co.

This device has a bronze casting bolted to the side frame, with an outwardly extending hub which contains a series of steel plates and fibre friction disks. The outer steel plate has a spindle with its inner end bearing in the bronze casting. This spindle plate is threaded into the hub and has face holes for a point spanner. The friction discs are packed in grease and the desired resistance is governed by tightening or loosening the spindle plate,





which in turn is held in position by a copper seated locking bolt. Pinned to the spindle, back of the casing, is a lever, the other end of which is pivoted on a second lever pivoted on a plate secured to the springs by the shackle yokes. The joint connecting the two levers has a tapered stud working in a fibre bushing for taking up any possible wear. The absorber can be applied inside or outside the side frames.

Briscoe Mfg. Co.

Radiator ideas can be studied here. The flat tube radiators, with features peculiar to Briscoe construction, are made with gang fins two, three or four tubes in depth. The tube lock is removable and is tested before the brass casing is applied. The flat tubes are made in three sizes and the style of the perforations can be varied. Among those using this flat tube style of construction are the Packard, Pierce and Peerless people, the method of construction adapting itself to a variety of casing designs. The crank hole is placed in an apron, which projects below the lower tank of the radiator.

Kinsey Mfg. Co.

In addition to the Kinwood radiator the company shows hoods, fenders, tanks, pressed steel dashes, brass mouldings for steps, tool and battery boxes, a gasoline gauge and other specialties in sheet metals. The radiator is of the flat vertical tube variety with water spaces 3 9/16 by 3 1/16 inches. The flat tubes are flanged into tanks at the top and bottom. The wide flat tube construction is continuous from front to back of the radiator. For the Kinwood oiler it is claimed that each feed can be regulated from half a drop to fifteen drops for every 320 revolutions of the driving shaft. It starts with the motor and stops feeding when the motor stops. The adjustments are outside the case. The oiler is designed to be operated either by lever or by means of a ratchet. Individual pumps, corresponding to the number of lead tubes, are secured to the

bottom of lubricator and operated in batteries of two or more by the revolving eccentrics, so mounted on the ratchet shaft that the downward stroke has a quick action regardless of the speed of motor. The double dog arrangement, moving a half tooth at each revolution of the driving shaft, does away with the need of worm gear for speed reduction from the motor to the oiler. The plungers are connected by yokes projecting through the top of the oiler and the action of each pump can be seen at all times and be regulated from the outside. The body has gauge glass at one corner and a filler opening is provided.

Consolidated Mfg. Co.

The 1906 model of the Yale-California motor cycle is fitted with a 2-horsepower motor which has 2 3/4-inch bore and 3-inch stroke. This machine differs somewhat from other motor cycles in that the flywheel of the engine is on the outside of the crankcase rather than on the inside. The frame is built of 18-gauge tubing, with drop forge connections, the forks being made from seamless sides and fitted with a spring device. The crown is of the four-plate design. Lubrication is obtained by a force feed oiler and the control is operated through the left grip. Transmission is by a two-ply stitched endless belt running over a wood pulley lagged with leather and strapped to the rim of the hind wheel. The belt also runs over a

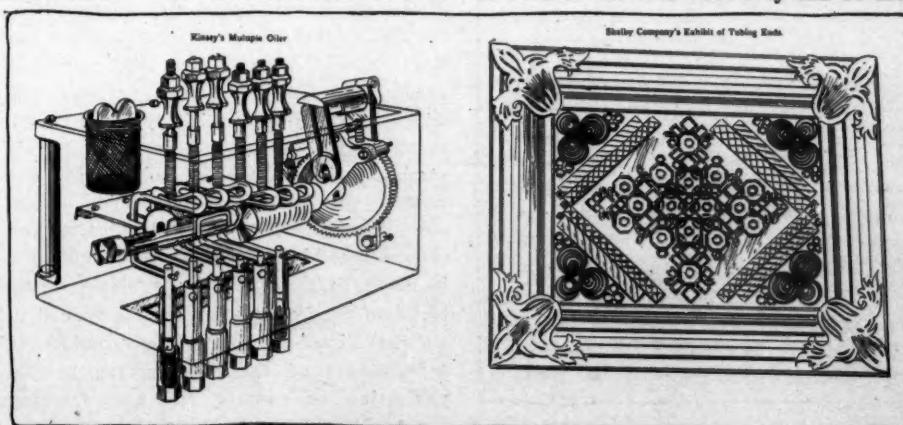
ball-bearing idler suspended from the rear forks and kept taut by a stiff spring. The oil and gasoline tanks are sufficient in size to carry a supply for 100 miles. The rear wheel is fitted with a brake and a Corbin coaster. Steel guards are placed over both wheels. The machine complete weighs 110 pounds.

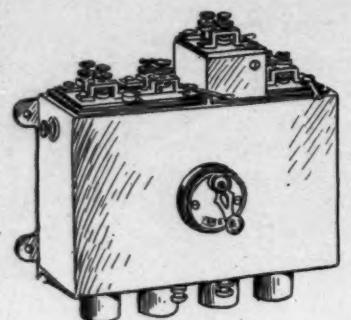
Sherwin-Williams Co.

This is a large paint manufacturing concern well known in the carriage trade and which is now supplying paints and varnishes to the automobile trade. The exhibit consists wholly of varnishes and quick drying coach and automobile colors tastefully arranged on boards for the inspection of manufacturers and others interested in the painting line.

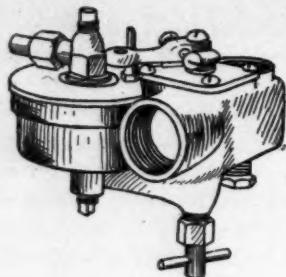
Gilbert Mfg. Co.

Although this company makes tire casings, leggins, covers, steering knuckle protectors, tool rolls and other things of a similar nature, it stars the Gilbert tire case, which is made in either enameled duck or leather fabric. This device is for the purpose of carrying spare tires and protecting them from oil, water and dust. It can be strapped to any desirable place. There is also an inner tube case which will hold two small or one large inner tube as well as the Gilbert rawhide tire band. By fitting these bands with anti-skid rivets and placing three of them on each of the rear tires they can be used





Pittsfield Multiple Coil



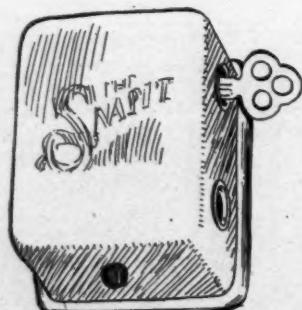
Holley Carburetor



Majestic Chime Whistle



Witherbee Igniting Battery



Goebel's Snap Switch

to get traction in snow or heavy mud. The steering knuckle boots are designed to protect steering connections. The tool rolls are made in enamel duck as well as leather fabric. Lamp covers, sleeve protectors, storm aprons—in fact covers for everything for covering the automobile and its parts are found.

Atwood Mfg. Co.

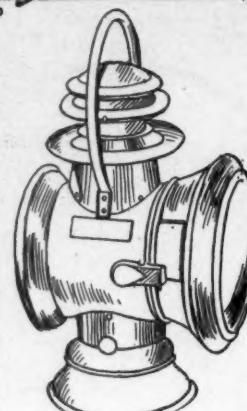
Acetylene gas headlights, searchlights and generators, as well as a line of oil side lights and tail lamps are exhibited. The generator has several new ideas in its construction. There is ample space provided for the residue or ashes of the slackened carbide. The residue, being dry, does not cake. The water feed furnishes just enough water to correspond with the quantity of carbide. The carbide basket is reached by partially unscrewing two thumb screws. The generator is charged by uncovering the drawer; then the basket is filled to the level, the door screwed down tight and the generator filled with water through the filled cap. The water enters the carbide chamber through a perforated disk surrounded by a metal collar located in the cover of the drawer.

Morgan & Wright

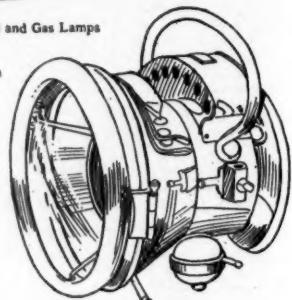
As usual this tire firm has a handsomely fitted booth, in which samples of tires made by it are displayed, as well as sections. The universal rim, which has aroused widespread interest, has been adopted by this firm. As described elsewhere, this rim accommodates either a clincher or Dunlop tire by reversing the bead which holds the tire in place. Four types of tires are made—the clincher, Bailey tread, and two styles of Dunlop, one for standard and the other for universal rims. The most conspicuous improvements over last year's tires are in the separately compounded tread, which is made of specially tough stock and vulcanized to the body of the tire by the open-cure process, and a 40 per cent increase in the fabric used. All tires are now completely wrapped.

Pittsfield Spark Coil Co.

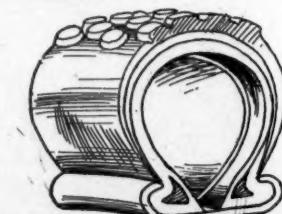
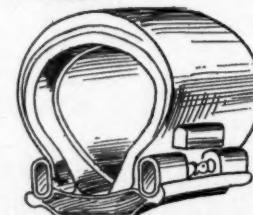
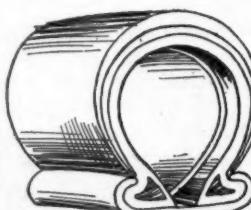
Of course the Pittsfield coil is the main part of this exhibit, but not all, for in addition there are timers and spark plugs, the last named being the Jewel, which has been altered some. The mica core is ground to a perfect bevel, the shell on which it fits being bored to the same bevel, so that the core is held in place by inserting it into the shell and tapping the base of the electrode. The inside of the core is made of pure sheet mica wound around a solid steel electrode. Connection is made to the cable by a simple brass terminal. New ideas have been worked in on the Pittsfield coil. The armature is independent of the main spring at the projecting or contact end and freezing



Atwood Oil and Gas Lamps



A Fine Monogram



Morgan & Wright Tires

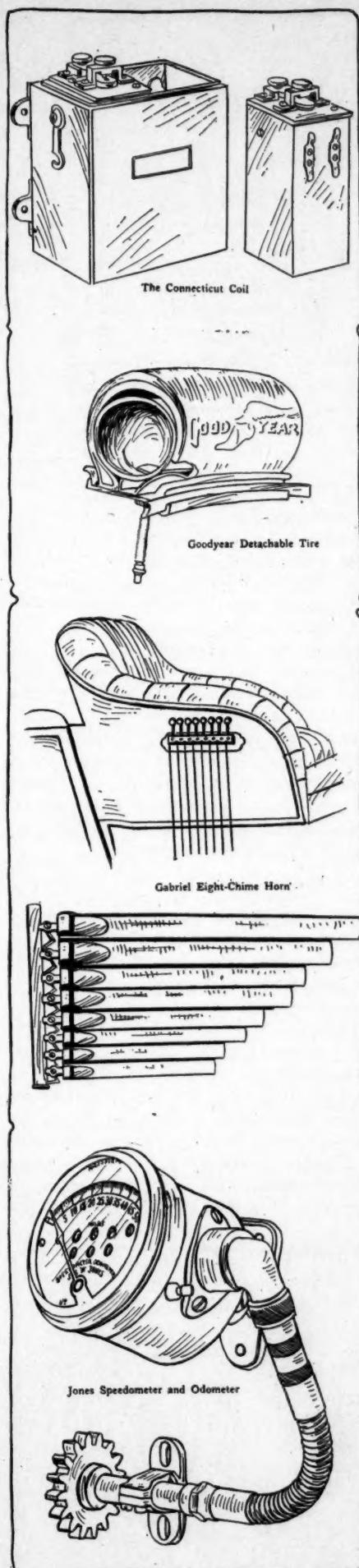
or sticking is avoided by the armature being allowed to swing a little beyond or higher than the contact breaker at the time of the break. When contact is again made the armature, with considerable force back of it, breaks the connection between the platinum points. A long range of adjustment is had by the arrangement of the auxiliary or tension spring and the tension adjusting screw in the block. It is claimed for this vibrator that it can be only adjusted to consume the maximum of current. Waste of platinum is avoided by mounting the platinum contact point on the springs and projecting through the armature, the spring serving as a cushion. The double movement of the spring and armature has a tendency to eliminate the electrolytic effect of the current upon the platinum. The Pittsfield timer is made for one, two, three or four cylinders. The case is of aluminum and the working parts of steel. The arms are solid steel, with coiled springs in the pivot ends which hold the rollers on the hardened steel cam. This latter is pinned by a steel pin to the secondary shaft of the engine. The contact is made by the cam lifting each arm in turn and engaging the contact surfaces with a slight sliding motion. No screws are used in its construction.

New York & New Jersey Lubricant Co.

Non-fluid oils, the N. F. O. lubricant gun and N. F. O. non-carbonizing gas engine cylinder oil interest many. For automobile use non-fluid oils are made in two gravities—the K No. 000 and the K No. 00 special, the former being for use in compression cups on bearings of engines and motors, for packing differential gear cases, planetary transmission gear cases, bearings of steering gear, ball and roller bearings, axles, cardan joints, etc., while the latter is used in sliding gear transmission cases, ring oiling and bearings of motors on electric vehicles. Several improvements are noticed in the lubricant guns which can be used for supplying grease or non-fluid oil as well as ordinary fluid oil.

Connecticut Telephone & Electric Co.

This company recently placed upon the market a coil which is made on the unit system. The coil is so constructed that connection is made when a unit is placed in the coil box by means of contact with a spring. The upper back edge of the unit is slightly rounded at the top, so that the coil is made to snap forward into position, thus pressing the double end springs into contact with the metal surfaces connected to the wires. The core is made of Norway iron and is enclosed in an insulated tube. In insulating the primary and secondary windings mica, rather than wax paper, plays an important part. The condenser is made with but two pieces of



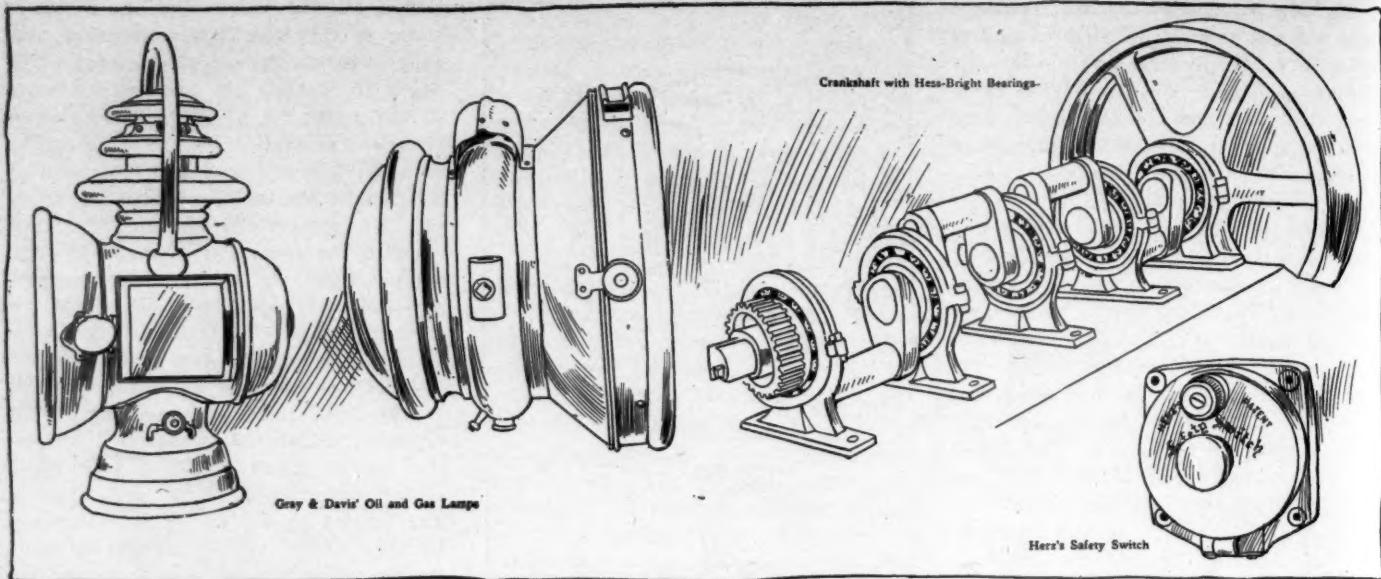
tinfoil, but they are folded like a bolt of cloth, so that two layers of onion skin paper separate the layers of tinfoil. The edges of the foil not reaching the edge of the paper by about $\frac{1}{8}$ inch insures electrical separation on the layers. The core windings and condenser are placed in a box, upon the top of which is the vibrator. The contact screw is self-locking. A recess in the under side of the bridge contains a small coil spring which is pressing downward on a small hexagonal nut through which the contact screw is threaded. The nut cannot turn, as part of its depth fits into the hexagonal hole in the under side of the bridge. The pressure on the nut, wedging it against the threads, gives a friction lock which allows the adjusting screw to be turned. The tension on the spring is determined by the amount it is compressed by pushing the nut against it, and then screwing in the contact screw. The screws which hold the body in position do not make contact by having wires under their heads, but screw into small brass bushings. The bushings are drilled and a wire is passed through them and under the head of a small screw which makes contact with the bushing so that the bridge screws may be removed without twisting or disturbing the wires.

Gabriel Horn Mfg. Co.

The real novelty in this line of horns is one with eight chimes, which has just made its debut. These eight chimes form an octave, each one tuned to a different key, so that it is possible to play ordinary airs, the chimes being operated by means of a set of keys attached to the side of the seat. In the other Gabriels are found two, three and four chimes. The new valve works under any kind of pressure, opening the pipe to the horn and closing the muffler exit, which directs any part of the exhaust desirable through the horn. As is well known, the Gabriel operates by means of the exhaust from the engine, blowing with less than a pound pressure.

Goodyear Tire & Rubber Co.

A new detachable tire and universal rim form a combination which the Akron people are telling the onlookers will do away with 90 per cent of the tire troubles. The new tire has a wrapped tread made of rubber of two different grades of toughness and elasticity. The outer layer is made of tough, dense rubber, claimed to be almost as durable as rawhide, while the inner layer is pure Para rubber, which is mixed with ingredients to bring out springiness and liveliness. These two layers are made inseparable by a special process of vulcanizing so that they cannot be separated, even with a knife. To prevent creeping a mesh of piano wire tape is vulcanized into the tire base on each side. No mechanical fastening of any kind is used and it is asserted the



tire can be used partly inflated. Rim cutting is guarded against by the flanges of the universal rim forming about a 60 per cent arc of a $1\frac{1}{4}$ -inch circle, which gives about five times the usual bearing surface. According to one of the salesmen, this tire has been ridden absolutely flat for 25 miles on rough pavements without the slightest injury to it. The universal rim is made up of four parts—the base of the rim, which attaches to the felloe of the wheel; the two flanges which are rings and slide on and off the rims, and a split-locking ring to keep the flanges from being forced off by the tire on the right, while on the left side of the rim base a lip performs a similar service. As long as these flange rims are kept apart the split-locking ring cannot come off, being kept on by the pressure of air. When deflated the flanges are kept tight against this locking ring at a point where it is split by a steel plate which is mounted on the stem of the valve. It is asserted that even on the road this tire can be removed with the hands in 30 seconds.

Witherbee Igniter Co.

All the sizes of the Witherbee storage battery, made for ignition purposes, are exhibited, and demonstrations are made

by the use of coils to show the quality of the spark the battery gives. In the Witherbee battery the wooden case is omitted and instead there is a hard rubber jar containing two or more compartments, according to the voltage required. Each separate cell is presumed to give 2 volts, so that an 8-volt battery would require four cells. Instead of sealing the cells, which is the usual method, the Witherbee has a cover that is bolted on and between the cover and the jar is a rubber gasket. A vent cap is also fitted to the battery and this is so made that it has an air chamber in the center to emit any gas that might form in the battery.

Hess-Bright Mfg. Co.

The use of ball bearings in automobile manufacture has grown to a large extent the past few years, and the Hess-Bright is one of the well known makers that is popular abroad. The exhibit of the Hess-Bright people is large, including samples of bearings for use on all parts of an automobile, not even excepting the crank and connecting rod bearings. Samples are shown where these bearings are in use not only in wheel bearings, but in the steering gear, steering knuckles and speed change gear. The line includes radial bearings for a load at right angles to the

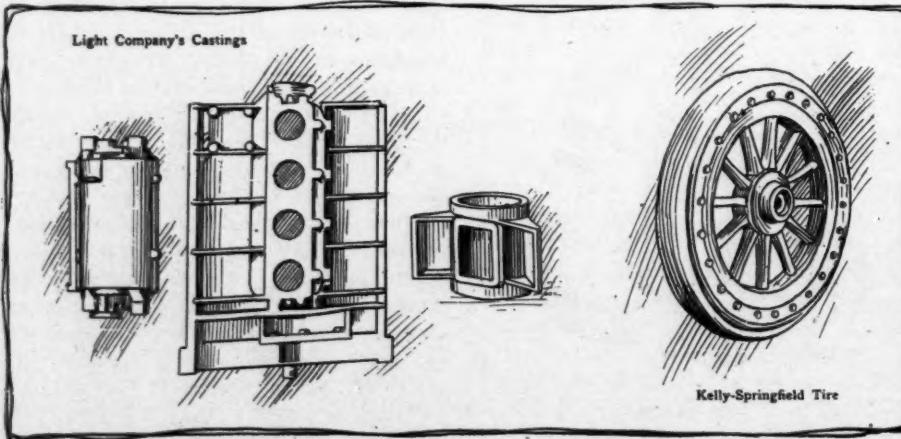
axis of a shaft, adapter bearings, similar to radial bearings, but provided with split cone adapters for clamping to shafts; and thrust bearings. Radial bearings consist of an inner race, an outer race, a series of balls and of a series of ball separators. The balls roll in grooved tracks of circular cross-section having slightly larger curvature than the balls, so that these contact with the races only at bottom of the grooves. The contact therefore is of the two-point order. As the race is a single complete ring without joint or opening the balls serve to lock the whole together as a complete unit. Elastic separators between the balls contain felt washers that incidentally store lubricant to guard the bearings for a time against neglect. The adapter bearings are similar to the radial bearings except that their bore is conical to fit a split bush; a nut on one end of this bush resting against one edge of the inner race serves to clamp the whole firmly to a shaft. The construction allows for such inaccuracies of size as are incidental to commercial line shafting.

Light Mfg. & Foundry Co.

This company's exhibit would not prove particularly interesting to the ordinary motorist, but the display of aluminum, phosphor bronze and brass castings proves interesting topics for the designer and manufacturer. The exhibit contains almost every sort of casting made from the metals that are used in automobile construction, including more particularly crankcases for one, two, three and four-cylinder motors and transmission cases. Most of the samples are made from the patterns of the company's customers.

Saks & Co.

Naturally the booth of this concern is popular with the fair sex, while the men themselves are not ashamed to cast a covetous glance in this direction, for everything in the way of automobile toggery is shown. Leather and furs are used most in the construction of the clothing



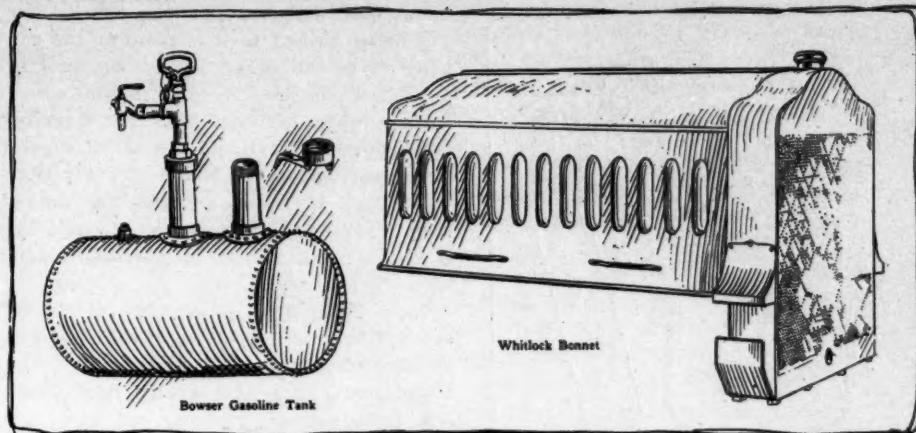
made especially for the use of automobileists. One of the long coats for women that is most striking is made of natural beaver fur, lined throughout with silk. The back is fitted much like a paddock and above the waist the front is in full blouse effect, with the skirt of liberal proportions. The coat has two split pockets and is 52 inches in length. For men there is a wide range in the way of coats, overcoats, caps, leggins and face masks. Neat chauffeur uniforms are also displayed, as well as goggles, lap robes and a hundred and one little things that come in handy.

S. F. Bowser & Co.

The Bowser gasoline storage tanks make up this exhibit, two types being shown. One is fitted with a detachable pump and is made of heavy sheet steel, riveted and soldered instead of being simply lap-seamed. It is finished in three coats of asphaltum paint, which, with the galvanizing, makes it rust-proof. It is filled by means of a filler pipe and is equipped with a suction pump which connects directly with the reservoir on the automobile. The direct lift outfit is filled by means of a heavy metal filling tube which is fitted with a lock cap with safety ball valve air vents. The pump measures a quart at each stroke and can be locked. Claim is made that it prevents evaporation.

C. T. Ham Mfg. Co.

Lamps and lots of them on this stand, including the Aurora and the Acme, side lights; the Vigilant, the Tourist and the Sunbeam, make a brilliant display. The cold blast principle is used by the company in its wares. This provides a forced supply of fresh air to the burner, thus insuring plenty of oxygen to feed the flame and producing a strong white light. The flame is protected from a direct draft. Features of the Acme and Aurora are two doors, front and back, and a simple locking device on the oil



Bowser Gasoline Tank

Whitlock Bonnet

pot. The back reflector is heavily silver-plated and covered with glass to prevent tarnishing. A draught keeps the front glass cool, thus preventing sweating. The Vigilant not only serves as a tail lamp, but there is a rigid handle which allows it to be taken off and used as a lantern. The Tourist is the same as the Aurora only that it is fitted with the semaphore optical flint lens, which concentrates the light directly in front. The Sunbeam is similar to the Acme, but is made of steel instead of brass and in place of a rigid bail it is fitted with a wire one.

Hartford Suspension Co.

A number of improvements are found on the Hartford suspension or shock absorber for 1906. The new suspension is now made from spring steel in all parts except the friction disks, which are of leather. The parts are held together by a central stud. The arms are pressed together by a large steel washer which has five prongs and so arranged as to take up wear automatically. The steel stud is provided with a lock nut which clasps the offset spider washer, thus binding the moving parts together and keeping a constant tension. The washer consists of a circular piece bored out to receive the tension stud and having the five arms bent down and slightly

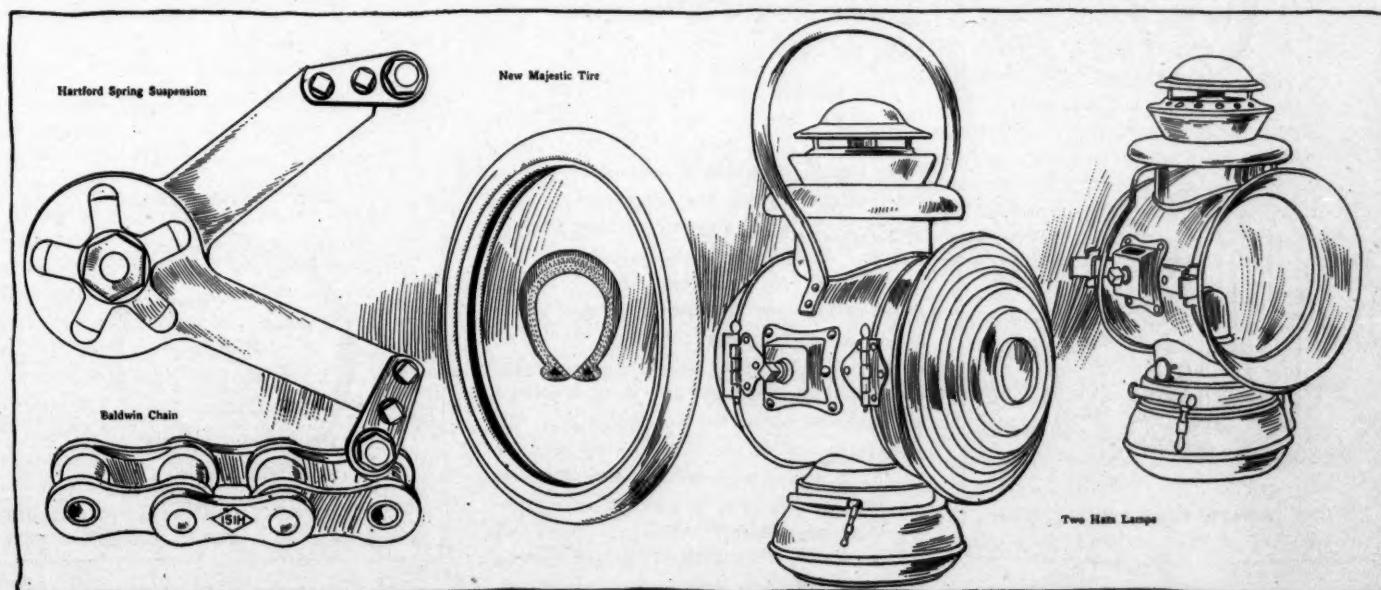
offset so as to form what might be termed feet, which are relied upon to furnish the tension necessary to hold the friction surfaces together, the lock nut acting more in the capacity of a retainer than anything else. There is no clamping device on the 1906 suspension, the lock nut doing away with the necessity for this.

F. A. Goebel

The Snapit lock switch shown here is designed not only for automobiles but motor boats. It is claimed to be thief, dust and waterproof. It is a box-like lock switch intended to be carried on the dash and is so contrived that the key which locks the box cover also cuts out the knife switch, thereby locking, as it were, the current and preventing the running down of the batteries when the car is standing by the roadside.

Baldwin Chain & Mfg. Co.

Besides a full line of Baldwin chains, bevel, internal and spur gears and a new type of muffler, the Baldwin people have a spring recoil check which has caused considerable comment. The check is designed to control the quick rebound from the extreme compression of the springs and to prevent jarring the passengers when the car is passing over rough roads. Its construction is simple, a steel shell or

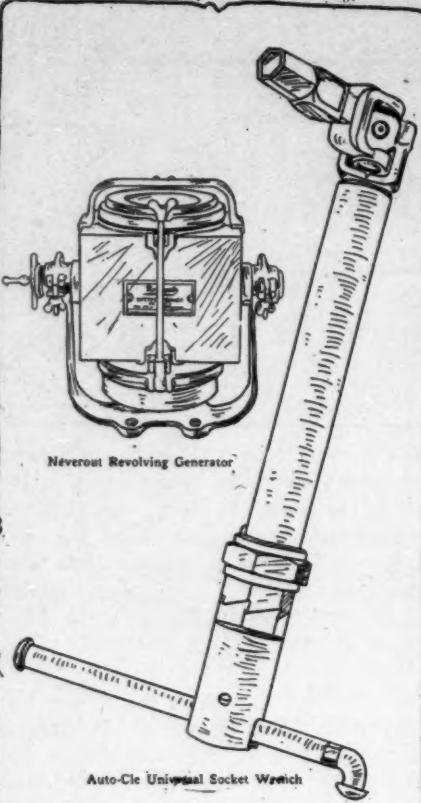


Hartford Spring Suspension

New Majestic Tire

Baldwin Chain

Two Ham Lamps



Neverout Revolving Generator

Auto-Cle Universal Socket Wrench



Spicer Universal Joint



Lacoste High Tension Magneto

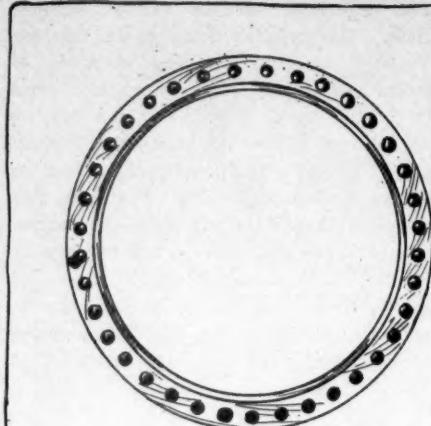
round case with a supporting eye on the top being hooked to the frame of the car body or to the floor. Inside this case is a divided piston covered with oil-treated leather, which contacts with the sides of the hollow steel cylinder. A set of toggle arms butt against each side of the piston segments. A yoke over the top draws them down and is attached to the axle by a strap. The action is automatic and without the use of air, oil or friction clamps. This check allows free action of the springs in the compression movements and controls the quick, upward rebound, preventing the springs from passing their normal position, yet still retaining all their elasticity and yielding qualities. It does not interfere with the movement of the springs when the car is moving slowly, but a quick movement or jerk causes the piston enclosed in the cylinder to expand and resist the action of the springs in proportion to the velocity.

Imperial Brass Mfg. Co.

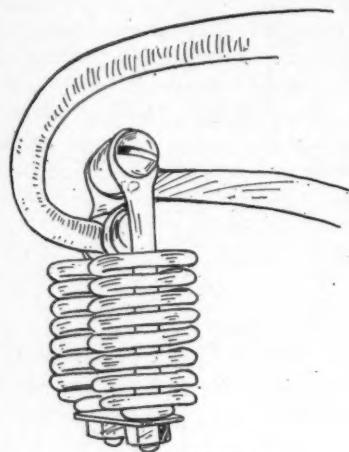
Pumps and an automatic lamp adjuster are found at this stand. The former is a device which moves the wheels so that in making a turn in the road the light is thrown in the proper direction and many dangers avoided. The Imperial-Lyon adjuster is operated by the steering knuckle rod, to which it is attached. If desired it can be made to turn faster than the wheels themselves. It is made of solid brass and every part is ball bearing. The Imperial-Wixon is a compound air pump with three air spaces. The low pressure is on the up stroke and the high pressure on the down stroke. The three air chambers permit of doubly compressing or compounding the air. Two cylinders and a hollow piston rod are used in the construction of the pump. The outer cylinder is threaded to the base of the pump. The handle is attached to the inner cylinder and the hollow piston is connected to the base and with the rubber hose forms the air outlet to the tire or tank. The inner cylinder is the only one that moves in the operation.

Leon Rubay.

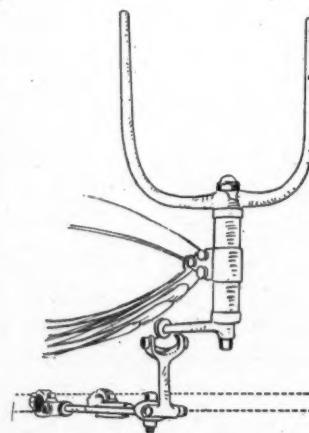
This exhibit comprises a most complete line of the latest things in ignition found abroad, most of them, of course, coming from Paris. The line is headed by the Lacoste magneto, but commutators, distributors, coils, and plugs in variety are also found. The Lacoste magneto is by no means new, as it is one of the leading ignition devices abroad and has had a good calling in this country. It is not much different from other systems which have double windings, but it is constructed enclosed so as to be protected. The armature has a double winding and revolves in a magnetic field produced by the permanent magnets, a current being produced at each half revolution. The armature is set in time with the motor and ad-



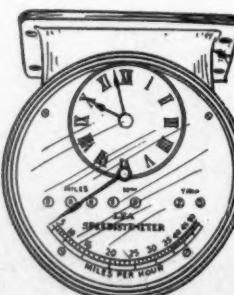
St. John Cushioned Tire



Supplementary Spiral Springs



Imperial Swinging Bracket.



Lea Speedometer

vancing and retarding are performed by means of a half gear wheel meshing with ribs on the armature. When the gear wheel is moved the armature is also moved, either forward or back, thus changing the time of the spark with relation to the stroke of the piston. Mr. Rubay shows also a high tension switch which he secured in Paris.

Manhattan Storage Co.

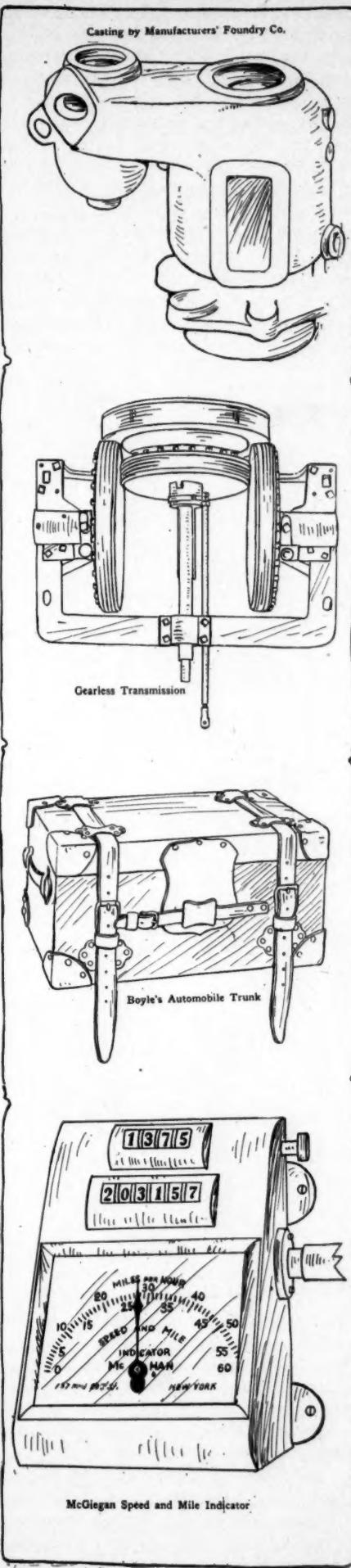
There is little in the sundry line that is not exhibited by this concern. A display consisting of many of the well known makes of tires, tools, lamps, pumps, horns, clothing, goggles, clocks, plugs, jacks, coils, batteries, carbureters, lubricators and gauges, as well as a line of marine hardware, is found in a large stand in the garden. The company makes as its leader in the display an independent-made tire which it calls the Majestic, which is of the ordinary clincher type and which is made in all sizes. It also exhibits a three-tube horn which is operated from the exhaust. This is made in a manner similar to other multiple-tube horns and is attached to the side of the car.

Rose Mfg. Co.

Neverout condenser-mirror lens motor headlights, searchlights, side oil lamps and the company's patent invertible safety gas producer are shown. This last named is the leader of the line, its makers believing they have something new in their device which discontinues the generation of the carbide by breaking contact between the moisture and the dry carbide. This is done by simply inverting the producer, which is swung on an axial bracket. Stopping generation in this manner is said to reduce the cost of the gas to $\frac{1}{2}$ cent an hour and the annoyance of after-generation is done away with. The action is entirely automatic and the gas is made only when needed. It is in no sense a generator, it is asserted, but a gas producer. A white and dry gas, producing a flame of intense whiteness, being secured.

Spicer Universal Joint Mfg. Co.

Spicer universal joints are well known and the company has prepared an attractive display. In these goods steel drop forgings are used for all parts which are under stress of power transmission, and the casings used to exclude dust and retain the lubricant are of cold drawn steel, accurately pressed into shape. When the joint is assembled the casing is filled about two-thirds full of a light grease, so that the driver only has to look to his lubrication once in 5,000 or 10,000 miles, according to conditions. One of the features on this stand is the universal joint and brake drum combined. The joint has the casing made in one piece and with one opening to be closed



against dust and lubricant. The interior construction is similar to No. 2, in which no bolts, nuts, screws, pins or other fastenings are used. The brake drum attached to the No. 3 joint is made of pressed steel 3-16-inch thick and with hardened and ground face. The stock sizes are 7-inch diameter by 2½-inch face and 8-inch diameter by 2½-inch face. A slight change is noted in fitting the universal joints to the shafts, a square hole in the hub of the universal joint fitting to a corresponding square part on the shaft, the joint being held in place by a steel nut on the end of the shaft. A taper fit can be furnished if desired.

Jones Speedometer.

In the latest type of Jones speedometer-odometer the principle of centrifugal force is retained. The speed is indicated whenever the car is moving, whether forward or backward, by the hand pointing to large figures on a metal dial. Dials are made to read the speed up to 50, 60 or 100 miles an hour. The season mileage registers up to 10,000 miles, and the trip mileage registers up to 100 miles. This may be reset to zero by pushing a button. In both the trip and season odometer columns the miles are registered in black figures and the tenths in red figures. The new instruments are incased in a dust-proof brass cup and are self-lubricating.

Railway Appliances Co.

Two sets of Auto-Cle wrenches, each a small work shop in itself, are on this stand. The Auto-Cle is a ratchet wrench, the universal joint allowing the wrench to be used at any angle, thus avoiding crawling under the car to adjust or turn nuts. The ratchet works in either direction by slipping the collar up or down. It also can be used without ratchet movement. There are long and short extensions that reach into the crankcase and a long socket for removing spark plugs. With the smaller set there are ten different sizes of sockets and with the large one thirty. The small set comes in a leather case and the large one in a wooden box. The company also has the Q and C Stanwood step, which is made of thin strips of Bessemer steel, square sheared, and bent so as to form corrugations across the steps and fastened so as to make movement impossible. The frames are made of rolled steel with a ledge on the inside to carry the strips and square on the outside. The tread gives a non-slipping surface and the steel step makes a foot scraper.

L. J. Mutty Co.

The exhibit of this concern consists chiefly of samples of cloths for automobile tops, curtains and slip covers, the line including everything that is known both in Europe and America. Many of the

samples are of artificial leathers and pure leathers that were brought from Europe during the past fall and which are such as are being used abroad. The line is complete, including all the varieties of rain cloths and leathers that are ordinarily used for this purpose.

Rushmore Dynamo Works

A large display of Rushmore searchlights, for use on automobiles and boats, is made. Generators and electric searchlights are also shown, the latter being for marine use. The automobile searchlight is the same that has been exhibited for a number of years, the Rushmore people believing that they have reached the end of improvement. A new generator is shown which has the carbide basket hung by opposite corners and which is shaken by means of a weight above in one corner. The regulating chamber is separated from the water tank by a false bottom, through which the water passes by a shut-off valve. The water, to reach the carbide, overflows a short central standpipe and when the gas reaches normal pressure it forces the water back through a tube to the tank, uncovering the top of the standpipe. Then no water can reach the carbide except through a reduction of the gas pressure.

St. John Rubber Tire Co.

The tire put out by this company, samples and sections of which are on exhibition, is made of solid rubber, but openings around the tire are made with a view of producing a cushion tire in effect. The tread is from $\frac{3}{4}$ to $1\frac{1}{2}$ -inch thick, according to the size of the tire, and the inside, which rests against the rim of the wheel, is also solid. Between the tread and the inside surface are holes, so that the tire gives a cushion effect. The tire is fastened to the rim by means of $\frac{3}{8}$ -inch brass bolts which pass through brass plates resting in the holes between the cushions. The tire is made to fit either Dunlop or Fisk rims, but not clincher rims. In addition the exhibit comprises the tires which were used on a White steamer by an individual owner, who reported having used the tires over 2,500 miles without touching them once.

Remy Electric Co.

The new Remy magneto's, both for low and high tension systems, show a number of improvements and changes over the goods put out by this house last year. The high tension magneto generates a strong current at low voltage and high amperage, delivering the current to the coil or transformer, which in turn delivers it to the motor through the distributor. The magneto is timed with the motor, as it generates two impulses for each revolution of the armature. The spark is advanced or retarded by rocking the circuit

breaker around the armature shaft, as the armature shaft is set so as to be in time with the motor. The armature winding consists of a single coil, one end of which is grounded and the other connected to the conducting pin which carries the current to the conducting bearing, from which it is delivered to the wire leading to the coil. In the low tension magneto two impulses are generated for each revolution of the armature and at opposite points in the armature revolution, so that as the impulses on this magneto last for only a part of the revolution, the armature must be timed with the make-and-

the flywheel of a motor, as the former must be properly timed. Advancing or retarding the spark is accomplished by timing the electrodes, the magneto, and its gearing remaining the same, wherein the low tension differs from the high tension affair.

Automobile Cover and Top Mfg. Co.

This is a New York concern which exhibits the Gabriel horn, for which it is the eastern distributor, and a large line of cape cart tops in all the modern designs. Samples of top coverings such as mackintosh, whipcord, khaki, leather and pantosote are exhibited also. Among the other samples are full leather victoria tops and slip covers for automobile upholstery. The company also shows samples in various sizes of the supplementay spiral spring which has become rather popular among many users of automobiles.

Motor Car Equipment Co.

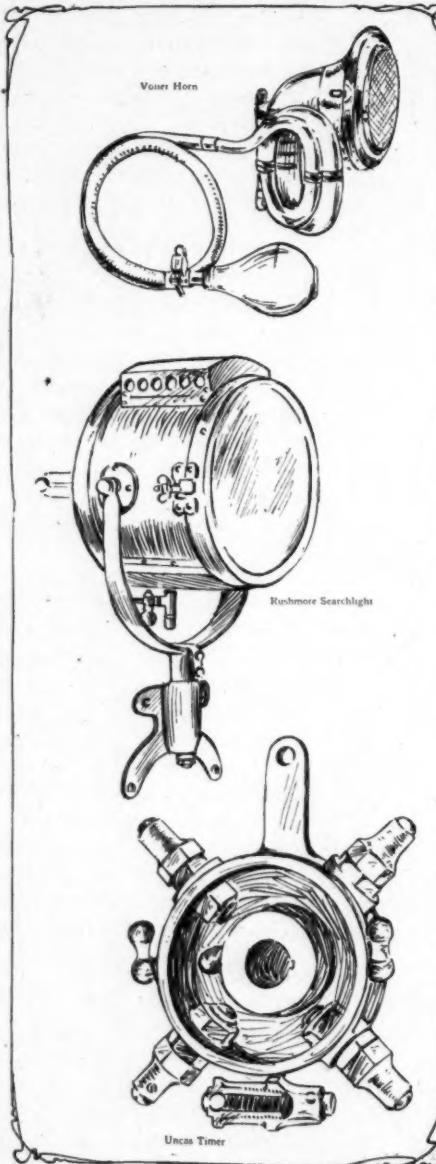
At this stand there is an endless line of the latest designs of Blanchard French horn. Some of the newer varieties consist of a triple twist, which gives a low, deep tone. Two forms of reeds are used in Blanchard horns, one being adjustable and the other being in a fixed position. In addition to the line of horns, the Continental calliope is shown. This is made in the form of three tubes of different lengths connected at the whistle end by central pipes and is operated from the exhaust of the motor.

J. G. Judson Co.

Formerly the Judson-Downing Co., this concern under its new title is displaying its line of automobile supplies and specialties for which it is direct factory selling agent, having on the stand the Alpha and Searchlight lamps, Skinner & Skinner pumps, Adwear tire sleeves, Superior pump with gauge, Superior generator, Scott's mufflers, flexible horn tubing, horn screens of all designs, anti-skid devices, spark plugs, B. & R. swinging brackets, B. & R. wrenches and the Woodworth detachable tread. The company controls the eastern territory for the Skinner pump.

Motor Car Specialty Co.

A new speedmeter, the Speedistimeter, and the Lea pump are found here. The Speedistimeter is a combination speed recording instrument, a total odometer and an 8-day clock, fitted in a polished brass case and connected to the wheel by means of a flexible shaft. The speed recorder has all moving parts made of steel, hardened where necessary. The main spindle runs on ball bearings. No worm gears are employed and the standard instrument is graduated to 50 miles an hour. The total odometer registers in miles and tenths of miles up to 10,000. The trip odometer goes to 99 and is returned to zero by a knob on the bottom of the case. The clock is made by the Chelsea Clock



break apparatus and with the motor, this being accomplished by setting the gears which operate the magneto from the cam-shaft or the motor-shaft, as the case may be. Improper setting might prevent the making of a spark at the right time, inasmuch as there is a period of time with the low tension magneto when no current is generated. On this account the magneto gears are marked so that they may be properly set. This form of magneto is not at all similar to the ordinary magneto which runs by friction pulley from

MOTOR AGE

Co. The Speedistimeter is attached by a fixture consisting of a saddle which fastens to the steering knuckle, a bracket for a ball bearing pinion and a distance rod fitted with two ball and socket connections. The flexible shaft passes down through the floor of the car instead of over the side. The speedmeter is similar to the Speedistimeter except that it is without the clock. The Lea pump has pistons of brass fitted with cup leathers and is operated by crank motion.

Herz & Co.

A variety of some sixteen different models of the Herz timers is to be found at this firm's stand. What is known as the tangent timer is conspicuously displayed. In this there is an absence of bearings, the body being made of metal and the contacts being screwed into the body, each being adjustable in order to time each cylinder separately. A steel armored ignition cable, something that has found favor abroad, is also shown. These wires appear neatly arranged with all the terminals in the form of a complete ignition outfit on a demonstrating board. A 16½-pound air pump, designed either for pumping tires or for supplying air for a tank on a boat to operate a whistle, is on the Herz stand. The Bougie-Mercedes wire and cable terminals, an electric emergency brake, the Herz foot lever switch or cut-out, the Hagan storage battery, Guenot coils and a large line of domestic and imported voltmeters and ammeters may also be seen here. A new switch called the Puck is made from hard rubber compound and has the contacts imbedded and secured. The contact making surfaces are protected against dirt by a metal cover, bearing the movable contact in the form of a spring button. The central brass plug may be removed. A spring in the back checks the turning movement of the cover where the two contacts come into central coincidence.

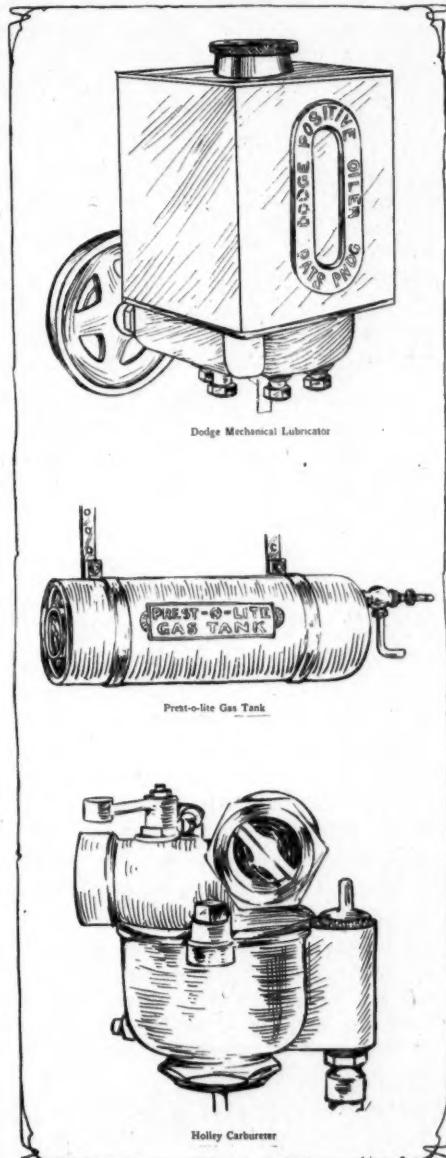
Warner Gear Co.

A complete line of Warner spur and bevel differential gears is exhibited in both the armory and the garden. The Warner differential gears for 1906 have a small axle clearance in the ends of the housing so that the gear case proper does not touch the axle. By this construction a sudden jar of the axle does not effect the teeth engagement. One of the equalizing gears shown is 24 inches long and is designed for large trucks. This large gear has eight pinions of coarse pitch. A new steering device is also exhibited. This is made with a segment and worm of open hearth steel cut on the theory of the Hendy or curved worm pattern. It has been designed so that each tooth in the worm is in full mesh from top to bottom in the segment at the same time. The steering gear segment and axle are made of one-piece drop forging, have long bear-

ings on both ends, and the whole is adjustable up and down and toward the apex of the curved worm. The ball and socket lever connection is made so that it can be reversed on front or back or right or left and also with a right or left hand worm.

Holley Brothers Co.

A new magneto, designed on the Huff system, is now being shown by the Holley people, as well as a line of its carburetors in many sizes. The magneto has its secondary winding, apart from the armature winding, and is designed to be operated in connection with a single



vibrator coil, with a set of batteries for use in emergency cases, if desired. The claim is made that the construction in the Holley tends to build up rather than deteriorate the magnets and that at as low a speed as fifty revolutions the magneto will provide a spark ¾-inch long and at 900 revolutions it will give a spark 3 inches long. The Holley carburetor has a restricted vertical passage from the mixing chamber to the inlet pipes of the motor, the spray nozzle being

in the center and the supply of gasoline being regulated by a needle valve adjustable from the bottom. The float is an annular cork and surrounds the mixing chamber. Initial air enters the mixing chamber from the bottom, but there is an auxiliary air inlet with a spring-controlled valve, this being above and a little to one side of the restricted inlet tube and adjustable by means of a thumb nut. The gasoline supply is regulated by the position of the float, the latter dropping on to a short lever, which is attached to the gasoline needle valve on the side opposite the auxiliary air valve.

Carpenter Steel Co.

This is the first year of this concern in the automobile trade. It has been a large producer of projectile steel and the automobile trade opening up made it believe it had a new market. It produces chrome nickel-steel crankshafts from slabs which have been cast and hammered and then treated. The claim is made that the tensile strength of chrome nickel-steel is from 135,000 to 150,000 pounds and that ordinary drop-forged steel has a tensile strength of but 60,000 to 70,000 pounds. The company also makes several grades of steel for gears, and samples of gears, crankshafts, springs, valve stems, and other parts made from this material are on exhibition.

Standard Welding Co.

This company is represented by Sales Manager Pirrong, Superintendent Heinsohn and Messrs. Quayle and Gorton. The company has exhibits in both the garden and the armory consisting of tubing chiefly of the grade of material used in specialty construction, particularly where bent parts are used. In addition there is a complete line of samples of electrically welded work, such as the company is producing for the automobile trade. There is also shown a line of the different rim and ring sections being made for use in connection with pneumatic and solid tires.

Prest-O-Lite Co.

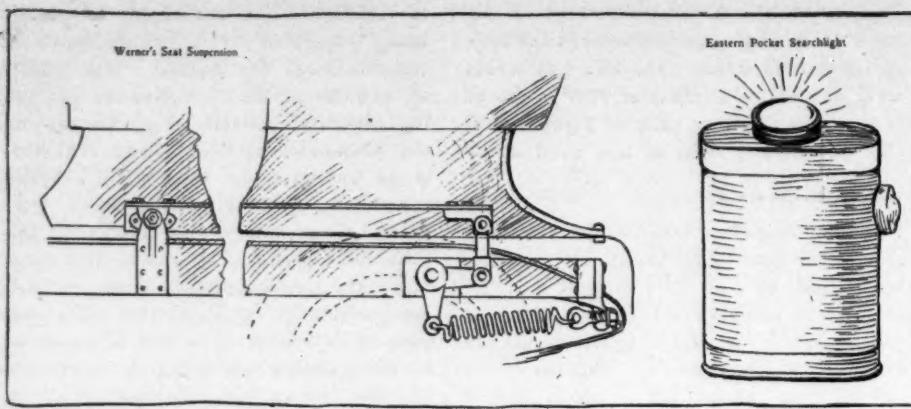
Two sizes of Prest-O-Lite tanks are made this year instead of one, the old size, 6 by 20 inches, containing 40 cubic feet of gas and the new one containing 80 cubic feet of gas. These cylinders, which are used for the storage of acetylene gas, are also fitted to many of the cars on view in both shows.

Brown-Lipe Gear Co.

None of the old models of the Brown-Lipe gear is shown, the company believing the old devices are so well known there is no necessity of showing anything but a few new designs in gears it has brought out for the 1906 trade.

Diamond Chain and Mfg. Co.

The Diamond chain for 1906 is as usual made in all sizes, and samples of these



various sizes are exhibited. There has been some slight change in the method of construction whereby the tensile strength has been increased and whereby the holes in the side bars are reamed to correct size after being punched, the claim being made that this increases the limit of fatigue and also assures greater accuracy. The rivets are made from nickel steel. The exhibit is modest, consisting only of samples of the various sizes of chains made.

Columbia Lubricants Co.

One might think it would be a hard task to effectively display oil and greases, but the Columbia company has an interesting stand filled with samples of Monogram lubricants. In the oil line there is the extra heavy gas engine cylinder, heavy gas engine cylinder, medium gas engine cylinder, light gas engine cylinder, V gas engine cylinder, super-steam cylinder, steam cylinder and machinery and engine brands, while in greases are the graphite gear, graphite motor, yellow gear and yellow motor greases and non-liquid oil. Monogram oils are made from stock which is particularly free from carbon and are all of low test. The four grades are practically identical and differ only in weight, cold test and viscosity.

Horace E. Fine

This exhibitor is a New Jersey engraver, who makes a specialty of manufacturing monograms to order and of turning out license number pads, a large line of which is shown. The pads are made in a variety of sizes and from both leather and aluminum, with the numbers fastened to the leather pads by the usual staples. In the aluminum tags the numbers are cast with the background of the tag itself. A line of metal polish, Gresolvent, goggles and lamp numbers is also shown.

McGiehan Mfg. Co.

Combining an odometer and a speedometer, the McGiehan device kills two birds with one stone, it might be said. It is of the dashboard variety, the odometer part of it registering both separate trips and total mileage, the former up to 1,000 miles and the latter to 10,000. The mechanism for the two—the odometer and the

speedometer—are operated by a flexible shaft from a front wheel. The speed indicator works by a centrifugal-acting mechanism and the governor is controlled by a governor instead of weights. Ball bearing shafts and the other working parts are of phosphor bronze and nickel steel, but the stationary parts are of brass and German silver. The speed hand has a range of from 2 to 60 miles, the indicating dial being 3 by 3½ inches, with an arc of over 4½ inches, allowing the numbers to be easily read at any speed.

Fisk Rubber Co.

All sizes of the Fisk mechanically fastened tires, both in the moulded and heavy car types and with regular and Bailey treads, are exhibited. The company also has a special equipment for demonstrating the manipulation of the tires and exhibits sections to show the design, quality and construction of tires. Fisk tires are shown in both the garden and the armory and between the two buildings a force of thirty men is kept busy.

Hartford Rubber Works Co.

On the stand of the Hartford Rubber Works Co. is a full line of Hartford Dunlop and Hartford clincher tires, as well as the Turner endless solid tires, rubber mats and rubber bumpers. The principle of the Hartford Dunlop detachable bead rims is the same, with the exception that the turnbuckle works from the under side, the groove in which the bead rests being cut out at one point to allow the turnbuckle to slightly protrude. The grooves

are made slightly deeper than heretofore. The floating ring is the feature. It is an endless band of light metal coppered on nickel to prevent rusting. The ring is practically part of the tire and has sufficient allowance over the diameter of the rim at the tire seat to insure ease in placing tire and ring on the rim in one operation. When the tire is in place its inside edges bear against the outside edges of the floating ring. Then when the metal bead is drawn down into the gutter by means of the turnbuckle, it wedges against the outer edges of the casing and prevents water entering the tire. In addition to sealing the tire, this floating ring is in effect an endless lug without the latter's drawbacks. It is claimed to be a non-creeping device. Should the tire be ridden flat, its edges rest lightly on the inner walls of the tire, holding the tire in position so that it cannot move or twist in the rim. There are many radical changes incorporated in the Hartford Dunlop and Hartford clincher tires. Both types are produced by the one-cure process, at the same time preserving the wrapped tread feature. Both tires are molded in a perfect circle to avoid fabric distortion under air pressure. A pure gum strip of rubber is placed between the outer ply of fabric and the cover proper. This strip of pure Para is carried up to and above the breaker strip and the combination is designed to prevent shuffling or blistering. The breaker strip also aids in resisting puncture. The beaded edges of the Hartford clincher are incased in asbestos to prevent rim cutting.

John Boyle & Co.

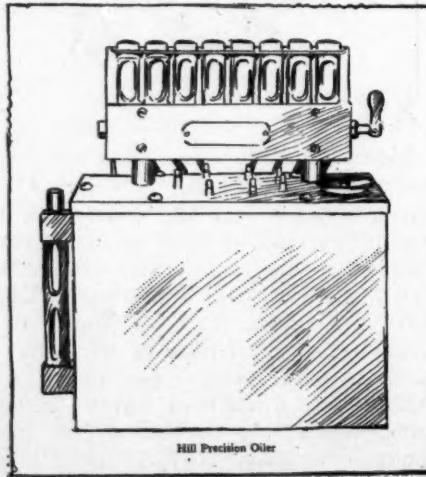
This is a concern which manufactures hampers for use on automobiles, as well as leather licensed number tags and tool-kit cases. Samples of the hampers, which are made in shapes to fit all the well known automobiles and are covered with heavy leather and supplied with straps and locks, are exhibited. The line includes samples of a number of different qualities which the concern puts out. The tool case kits are made with pockets for holding wrenches, files, hammers and such other tools as a motorist would be apt to use.

Consolidated Rubber Tire Co.

Kelly-Springfield endless tires, side wire tires, flanges, channels, etc., make up this exhibit. In the endless tire internal friction is avoided by means of V-shaped steel retaining wires inserted in a base of rubber and which bear directly on the band of the wheel, which practically dovetails the tire into the wheel. The rubber is vulcanized to these retaining wires, which are wrapped spirally with the canvas.

National Carbon Co.

About everything in the battery line for ignition purposes is shown by the National Carbon Co., which makes the



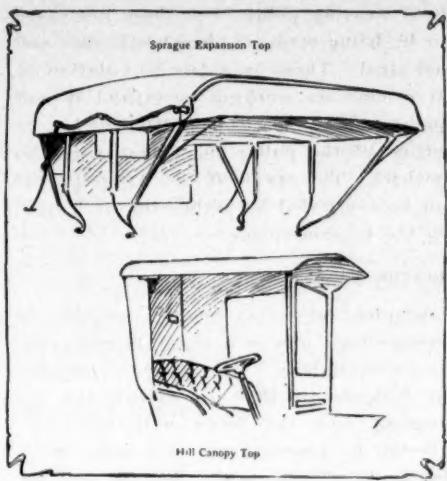
Columbia line. The Columbia dry cell, igniter cell, multiplex and autocell batteries, the latter waterproof and intended especially for marine work; a full line of hand and pocket electric lights, and other forms of batteries, all of the dry type, are shown. A new cell put out is the Reserve, which is claimed to be the means of doing away with much of the trouble heretofore met in ignition matters. The company also has on exhibition a battery connector having the usual flexible wire and terminals which are made so that once the binding post is set the terminal acts as a locknut and prevents the binding post nut from working loose.

Gearless Transmission Co.

On the stand of the Gearless Transmission Co. is a complete chassis which shows in every detail its mode of friction transmission of power. There are also separate transmissions showing the method used in marine work, and outside the armory is the National car in which G. D. Wilcox made a 3,000-mile demonstrating trip. This car is being used for demonstrating purposes. In the gearless transmission a clutch within the flywheel flexibly connects the crankshaft with the driveshaft for direct drive on the high speed, when the friction wheels are not used and do not even revolve. The band clutch is on the back face of the flywheel and by means of a pedal connects the driveshaft with the crankshaft carrying the flywheel. With the same movement the friction disks are moved away so neither of them is in contact with the friction wheel or the face of the flywheel, which gives direct drive, the friction wheels not being used in the transmission of power. For speeds other than the direct drive the friction disks have their peripheries in contact with the back face of the flywheel near its periphery, which causes the disks to rotate in opposite directions. The fastest speed other than direct drive is obtained when the wheel is contacting with the friction disks near their periphery. As the friction wheel is pulled backward closer to the axes of the friction disks the speed of the latter is reduced until in line with the axes, when it will be motionless. A reverse speed is obtained when the friction wheel is in the rear of the axes. Contact between the disks and the friction wheel is had by moving the disks against the wheel by means of bell-crank shaped pedal levers.

B. F. Goodrich Co.

Demonstrations of the ease with which the Goodrich company's new Quick Detachable tire can be put on and taken off attracts attention. In less than 30 seconds the tire is removed from the rim and in less than a minute it is on again, ready for inflation. The tire, while of the usual clincher type, is almost flat on one side, with the exception that there is a slight retaining bead, so slight that



it does not impede the entrance or exit of the tire to the hollow of the rim. An opening of peculiar shape extending say about 2 inches along the rim and clear through the metal is on the left hand side and almost to the outer edge of the unprotected edge. In line with this opening and about 6 inches below it is a metal projection, while at the left of the valve cover is another small bit of metal bent at right angles and having one end drilled with a $\frac{1}{2}$ -inch hole. These and the removable section of the rim comprise the fastening scheme. In attaching the tire the valve stem is of course put in the usual opening. Then one of the tongues of the removable rim section is inserted in the left hand side of the opening, a recess in the movable section settling down over the small projection on the rim proper, thus preventing lateral movement. After this the remainder of the removable section settles into place behind the raised bead. The other tongue is then opposite the opening, its insertion only being obtained by forcing the tire back on the rim for some distance when it is deflated. It is then moved forward and outward a bit to bring it

into line with the other projection and the outside of the wheel. Both these projections then stick through the rim at a point practically coinciding with the center of the valve stem but not flush with the felloe. Then that small extra piece comes into play, being slipped over the valve stem and forced behind the two tongues, the faces of the tongues and the piece gripping one another. This holds the ends of the removable rim down. Only one tool is used, it being employed merely to start the removable section or the tire itself from its bed after it has been in place for some time.

Eastern Carbon Works

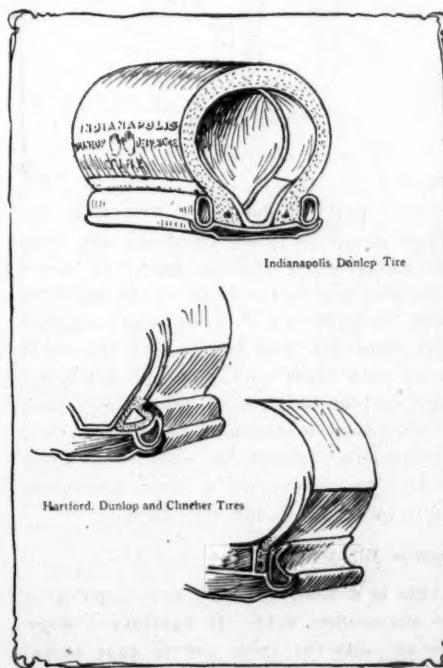
The line of the Eastern company consists of hand and pocket flashlights, dry battery cells for ignition purposes, battery connections, and similar goods that are used in the automobile business or the automobile itself. The hand and pocket flashlights are shown in a variety of forms and sizes. A new lamp is known as the No. 11, which is a medium between the No. 9 and the No. 10. This is made so that it can be conveniently carried in the pocket without inconvenience and without fear of short circuiting. The Eastern battery connections are made with rubber under one side of the connection end to act as a sort of washer and to permit the retaining nut to be screwed down tightly without injury to the connection and to aid in holding it solidly in contact.

Byrne, Kingston & Co.

As the years roll on the Byrne-Kings顿 line grows, so that now the firm's exhibit consists of coils, spark plugs, mufflers, steering wheels, pumps for water and oil and of course the carburetor which bears the firm's name. This is shown in several sizes and in two models. The new type has a central spray nozzle, automatic air intake, with a check ball valve for the gasoline supply into the float chamber; throttle, drain cock and round float and chamber. The float is in the shape of a horseshoe and is covered with a light thickness of copper to keep it in shape. The float is not attached to anything, lying on a flange surrounding the carbureting chamber. All the air which enters the carburetor passes through the automatic spring-controlled check, which has a regulating screw on the top.

Steel Ball Co.

The Hill Precision oiler consists of a rotating center post, actuated by suitable driving mechanism, carrying a chamber into which the oil is drawn from the tank, measured, and forced to each bearing by mechanical action which shoots the oil to the bearing with a force sufficient to overcome any obstacle that may exist in the pipes. The quantity of oil delivered at each discharge is governed by a set of in-



dependently adjustable feed screws, one for each feed, so that each individual bearing may receive the amount of oil its special needs require. One oil chamber serves from one to eight bearings, feeding in rotation, but feeding to each only the exact quantities for which it is set. In connection with the oiler are shown two different methods for enabling the operator to assure himself of the perfect working of this oiler. One of these is known as sight tests, and consists of a bank of glass tubes, corresponding in number with the number of feeds used, supported by a suitable frame, and is either attached to the oiler or placed separately on the dash. Inside of each glass tube is a small brass tube, closed at the top, but having a small opening in the side, through which the oil is driven against the side of the glass, showing the regularity of the discharges and the quantity of oil delivered. This test is made by turning a small thumb screw, causing the oil to pass through the glass. After the test is completed the thumb screw is returned to its normal position and the oil is again forced to the bearings. Another device is a constant sight feed consisting also of a glass tube connected with each delivery tube and through which the oil passes on its way from the oiler to the bearing. The glass is always full of oil, and each discharge is evidenced by the motion it imparts to a perforated aluminum float, which rises in the glass to a height corresponding with the quantity of oil displaced, which is the actual quantity sent to the bearing, the float then being automatically returned to its position on the inlet tube, and ready to indicate the next succeeding delivery in the same manner.

A. H. Funke

Lamps, generators and horns are the stock in trade on this well arranged stand. Five styles of lamps are shown—projectiles, searchlight and autolytes, while in the way of generators there are the Auto-lyte, of square style, and the Billy, of square type. Mr. Funke shows something new in his No. 93 lamp, which is constructed with extra heavy cast hinges, a special style of handle and which dispenses with a chimney. It comes with either a parabolic lens or a mangin mirror reflector. Horns there are aplenty—four models of chimed horns, one bugle horn and five of the bell type. The bugle horn has four tones.

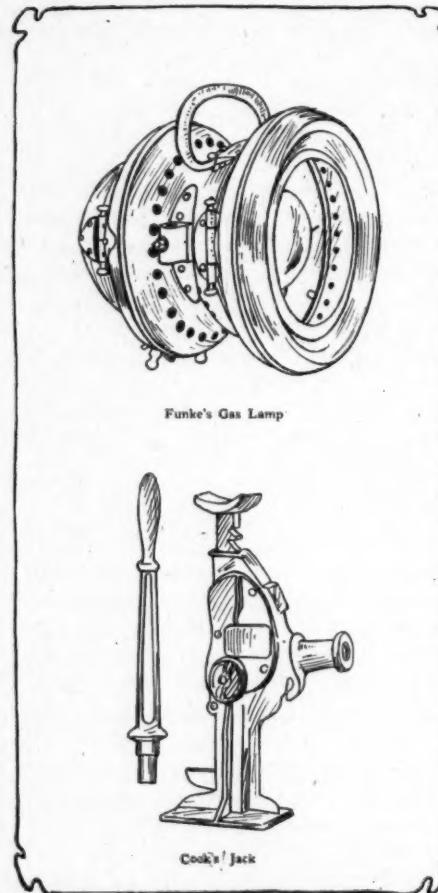
Motsinger Device Mfg. Co.

Demonstrations of the Motsinger Auto-Spark are given on this stand. The device is well known to the trade. It is wound for a slow starting speed, making it possible to start without batteries by turning the flywheel of the engine by hand. Once going, the governor on the end of the shaft of the Auto-Spark provides an even speed. There are only

three wearing points, but these are cared for by being made of phosphor bronze and tool steel. There is a free circulation of air around its working parts and it will operate in any position, with the top or bottom of the pulley in contact with the flywheel. The speed of the Auto-Spark can be controlled by tightening or loosening the tension spring.

Sprague Umbrella Co.

Samples of the latest designs of Sprague tops, one on a Franklin runabout, are on exhibition. The Sprague company has designed its 1906 top so that the top covering and the bows will fold sufficiently to place them on a level with the back of the seat, thus giving an unobstructed view backward. Instead of bending the wood bows at the bottom end, a strong slatiron is attached to the



straight part of the bow. The ends are curved so as to throw the bows out. The top rests, when thrown back, in brass arms attached to the body of the car. The front is made from forms made of cast steel, bent hot, and clamped to the wood frame with brass clips. The French plate glass is laid in channel rubber and held by hardwood mouldings. The wood used is mahogany, cherry or oak. The hood of the top shuts down over the glass front, to which it can be fastened.

Heinze Electric Co.

This is a comparatively new concern in the automobile field. It exhibits a large line of coils for from one to four cylind-

der motors, and single cylinder coils with high potential distributors for four-cylinder motors. Instruments for measuring the output of current are in operation, being mounted on a board in the exhibit. The multiple coils are made upon the unit system. The contact points are made from iridium glass and of large size to prevent wear. The vibrator arm is made light and of short length in order to produce rapidity of action and thereby secure an almost constant spark while the primary is in circuit. Large coils such as are used in X-ray work and wireless telegraphy are also shown.

Charles E. Miller

While this manufacturer, jobber, exporter and importer has a line of supplies which includes nearly everything in parts and accessories, his combination siren horn is probably the feature, although the Brampton chain, which is made of self-hardening steel, is well played up. It is claimed for the siren that it is the only one on the market that combines the siren and the ordinary horn. The sound produced by the siren is similar to those heard on ocean steamships, while the other part of the combination is designed for city use. A flexible shaft connecting with a friction pulley in contact with the flywheel of the motor operates the siren part of the horn. A lever which can be placed in any desired position brings the pulley into contact with the flywheel. The end of the flexible shaft is fitted with a spring bracket which draws the pulley out of contact with the flywheel when the lever is released.

Timken Roller Bearing Axle Co.

The Timken exhibit is most comprehensive, and includes samples of front and rear axles, housings, differential gears, and all forms of roller bearings such as are used in automobile work. A differential in section shows not only the bearings for the two ends of the drive shaft but the thrust bearings as well. In this the wheel bearings are directly under the brake drum, or practically under the center of the tire. Front axles of the square and I-beam patterns are shown, some are straight and others dropped in the center. Tie rods are made both in front and back of the axles, and all patterns show the latest forms of construction and the use of the best metals.

Dayton Electrical Mfg. Co.

Slightly larger than the Apple storage battery charger put on the market last year, the 1906 machine is designed to generate 3 amperes at 10 volts at a speed of 1,400 revolutions per minute, charging a four-cell battery at this rate. The machine is fitted with an Apple 4-inch bevel drive friction governor, but it may be driven by belt, chain or gear. Hydraulic pressure is employed in assembling the

armature and the commutator. The former is built up of japanned iron disks forced together on a brass sleeve, which in turn is keyed to the tool steel shaft. The commutator is made of segments of drawn copper with mica insulation. The fields are form-wound and heavily taped and shellaced. Additional insulation is forced into the armature windings by a vacuum impregnating system. The charger is had with two types of bearings—a plain bearing type with renewable phosphor bronze bearings and wick lubrication, and a ball bearing type fitted with Hess-Bright ball bearings. In addition to the storage battery charger, the company exhibits samples of the Spitfire plug and a line of induction coils. A new accumulator is made so that there can be no loss of liquid, rubber plugs being used to prevent this loss either through evaporation or spilling.

Firestone Tire & Rubber Co.

Besides its side-wire motor tire, the Firestone people have a new mechanically fastened pneumatic tire. The side-wire tire is constructed with steel cross bars inserted laterally at regular intervals near the inner edge and vulcanized in the rubber and becoming an integral part thereof. The tire is retained in the channel by two Swedish cold drawn steel wires made into hoops. Resting on a shoulder formed by the cross bars they hold the tire perfectly solid with an even compression. The tire is solid and is shown in endless as well as butt-end form in sizes ranging from $\frac{3}{4}$ -inch to 8 inches.

Manufacturers' Foundry Co.

This is a concern which makes cylinder castings for many of the automobile concerns of the country and its exhibit consists of samples of some of the different types of cylinders which it is furnishing to the trade for the purpose of showing the quality of work. The samples are in various stages of completion and a number has been made in section to show the waterjacket and the finish of the metal as it comes from the moulds. Samples are also shown of castings for pistons, rings and exhaust pipes.

Shelby Steel Tube Co.

The Shelby company's exhibit consists of several large boards upon which are arranged in symmetrical groups all the sizes of cold-drawn seamless tubing which enter into the construction of automobiles. The fact that tubing is becoming more and more popular in certain lines of automobile construction, makes the Shelby company believe that its field is being considerably enlarged.

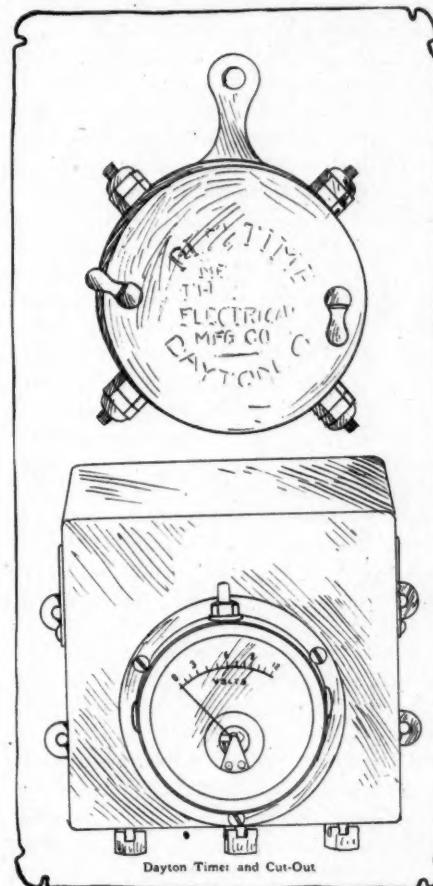
Springfield Metal Body Co.

Samples of the aluminum bodies, both finished and in the rough, make the major part of this exhibit. In addition the

company has on display the Springfield folding top, which it manufactures. In the body line there is the Tulip style, as well as a limousine with rounded corners. This latter weighs complete 450 pounds. It is of full aluminum construction and upholstered and painted. The tops are shown with both straight and curved slat-irons and with mackintosh cloths, imitation and real leather and a new cloth that is waterproof and non-fading. There is no rubber in this special cloth, so it can be cleaned with gasoline, or soap and water.

Semi-Dry Battery Co.

This concern is marketing a new dry cell called the Dunn, for which many



claims of superiority are made. The battery is shown as small as 2 by 5 inches and as large as $3\frac{1}{2}$ by 8 inches. The claim is made that the voltage is $1\frac{1}{2}$ and that there is a low internal resistance, giving 1.44 amperage through 1 ohm of external resistance. It is also claimed that there is a small fall in potential resulting from an hour's continuous work through 5 ohms resistance, followed by an hour through 1 ohm and again followed by 24 hours through 5 ohms, the total drop being only .02 volt.

Weed Chain Tire Grip Co.

At this stand there is a complete exhibition of the chain grips known as the Weed, which, by the way, were among the first of the kind on the market. All sizes

are exhibited, for tires from 28 to 36 inches by from $2\frac{1}{2}$ to 5 inches. There has been no material change in the Weed grip for 1906 other than a slight alteration in the locking device where the chains are put together.

Cook's Railway Appliances Co.

This is a concern which formerly was known as the Merrill-Stevens Mfg. Co. and whose business is the manufacture of jacks for lifting purposes. It has on exhibition several different sizes and makes a leader of one which weighs $8\frac{1}{2}$ pounds and which is given a capacity of one ton lift. The jack is simple in operation, the turn of the eccentric in the side of the frame reversing the movement of the lifting rack upward or downward as is desired.

G & J Tire Co.

The G & J exhibits in the gardens and the armory consists of complete lines of the Indianapolis Dunlop tires and the G and J tires, as well as a line of sundries, such as repair kits, tool cases, treads, etc. The G and J and Dunlop tires for 1906 are designated as one-eure wrapped tires. The G and J tires have a raised flap tread. The Dunlop tire now has a flap within it, thus giving a smooth surface for the tube, thereby protecting the latter from the rim and overcoming a tendency to creep.

Post & Lester Co.

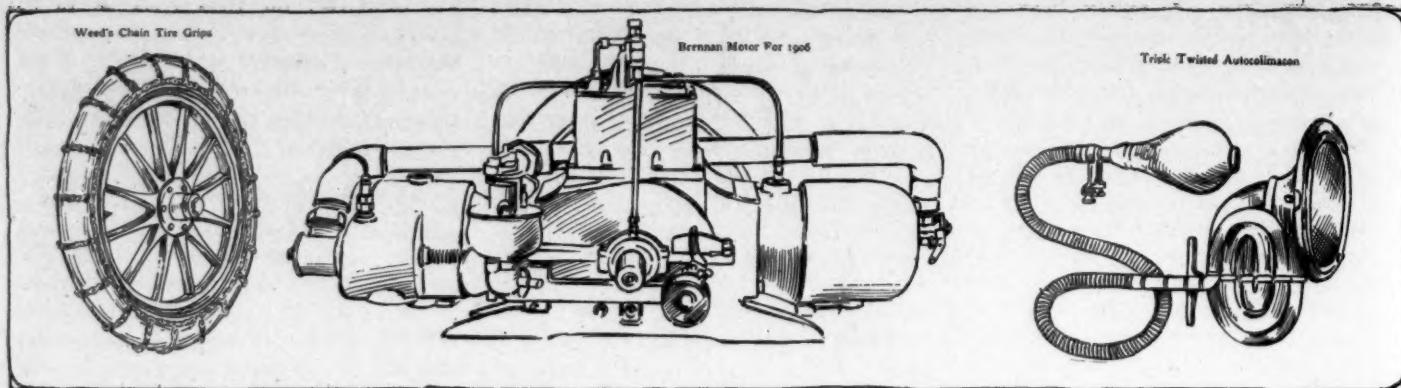
This Hartford concern displays a complete line of the Volier automobile horns in a variety of sizes and shapes, the Royal de Luxe lights and generators, and an assortment of Duray goggles. These are the principal goods of this house, but other articles of importance and usefulness to the automobilist are made and displayed, including odometers, cyclometers, tools, etc.

Hill Mfg. Co.

In this exhibit is a body fitted with a cape top and one fitted with a small top, such as a physician might demand for use on a runabout. The latter is made in mahogany and has a beveled plate glass front and, of course, side and back curtains. The cape top shown on the body is of modern design, with up-to-date trimmings and covering. This concern is also a large manufacturer of other forms of tops and canopies, as well as bodies and cushions for automobiles.

Pennsylvania Rubber Co.

In addition to its regular wrapped tread clincher the Pennsylvania company is exhibiting a flat tread tire of the racing type. This new model, owing to the shape of its tread, presents a uniform wearing surface which is claimed to add to its durability. Then, too, its thickness lessens the chance of puncturing, while the tread



is corrugated to prevent skidding. These corrugations even when worn smooth do not detract from the tire, because, owing to the breadth, the tire still grips firmly. Also it is claimed that an advantage is gained through the flat tread in that the weight is so uniformly distributed over about 3 inches of tread width. This type also wears down smoothly instead of chipping from contact with the road.

American Electric Novelty Co.

As well as being fitted to a number of demonstrating cars outside, the Ever Ready starter is found inside, too. This is a mechanical device which automatically starts a gasoline engine by means of a small release lever, which is connected by a wire cable to a foot lever on the floor of the car. After it has done its duty the motor rewinds it automatically, releasing it again when it is fully wound up. When this operation is performed, the starter is ready for more work. For the initial operation of winding up the spring, or in case of its running down because of spark failure the ordinary starting crank is used. The starter is provided with a sun and planet system of gears, with a reduction in torque of 10 to 1.

E. B. Meyrowitz

Besides volt and ammeters of various types, Mr. Meyrowitz has a full line of goggles, one of the new ones being without mask and with collapsible cups. The rims are nickelized and white or smoked lenses are fitted. Chenille edges the cups and also lines the leather nose-bridge. The bands are adjustable. The Four-Way has four lenses, each pair set at right angles to each side and set in nickelized frames, to which is attached a tan pigskin mask, which is lined with white chamois and edged with velvet.

Brennan Mfg. Co.

The Brennan Mfg. Co. shows 6, 8, 12, 14, 16, 20 and 30-horsepower horizontal motors. The design of the new crankcase allows the timer to be used on the lower or upper section of the case and has few moving parts. The binding posts for the terminals are stationary to the case. The contact cam, which makes and breaks the circuit at the terminals is a hardened roller, practically coming in contact with

the fixed or stationary terminals, is claimed to avoid all possible wear on the timer. The crankshafts are made from a solid billet of hammered steel, 40-point carbon, 3½ per cent nickel. The size of the bearings has been increased in length and diameter. The wrists or cranks are 1½ inches in diameter, 2 inches in length. The main bearings are 1¾ inches in diameter, 3¾ inches in length. The connecting rods are made from nickel steel and fitted with flange bronze bearings so that no part of the steel rod comes in contact with the steel shaft. The cap is secured and held in position by two ½-inch steel studs, fitted with castellated nuts and locked with cotter keys. The piston pin, hollow and made from tool steel, is locked in position with two special keys. Gears for operating the cams on secondary shaft are made from steel forgings and are enclosed in the crankpit which keeps them well lubricated and protected from dust and dirt. The cams are made from steel forgings carefully machined, fitted and hardened and operated against hardened steel rollers. The valves are made from special nickel steel. The exhaust valve is ½ inch in diameter. The inlet valve is 2 inches in diameter. The lubricator holds ½ gallon and acts as the cover of the crankcase. It has six sight feeds placed on top of the lubricator tank. Ignition is by jump spark. The mixing and float chambers of the carburetor are contained in one casting. The float is of the ring

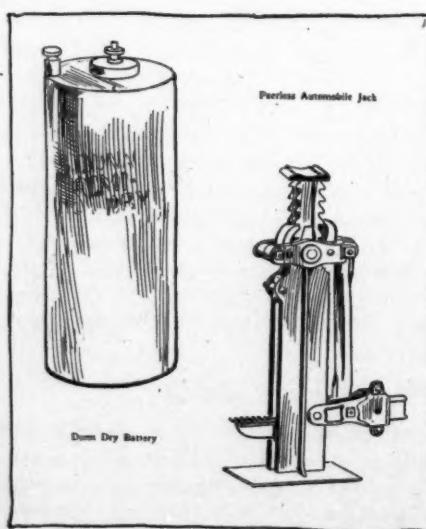
form, 3½ inches in diameter, with a 1¼-inch hole through the center. The float has sufficient buoyancy to shut off the needle valve under a 20-foot head pressure. The air inlet is fitted with an automatic inlet valve so as to provide for adjustment for the different atmospheric conditions. The funnel-shaped air inlet is fitted with a screen which protects the carburetor and inlet valve from dust and dirt. All connections on the carburetor are fitted with glands.

Wray Pump & Register Co.

Undoubtedly the leading point in the Kellogg carburetor shown here is that the needle valve is opened and closed simultaneously with the air inlet, so that as the motor speed is increased by giving it more air so the flow of gasoline is also increased by opening the needle valve. The air valve and the needle valve are interconnected by a pinion on the latter meshing with a toothed sector on the shifting lever of the former. A spraying nozzle, in the accepted sense of the term, is not used, but a shallow evaporating pan with perforations in the bottom is substituted. The incoming gasoline overflows into this pan and a part of the inrushing air passing through the perforations mixes with the gasoline. The passage of the mixture to the motor is controlled by a floating throttle valve.

Aster Co.

An excellent grouping of parts and components from France is here on view. There are two Malicet and Blin semi-chassis, one a shaft and the other a side chain drive. These chassis include practically everything but the body, dash, motor and radiator. On the chain-driven car the back ends of the rear springs have the usual connections. On the shaft-driven machine the rear springs are C-shaped and connected to the chassis by quarter-elliptic springs. All through the chassis are up-to-date, including four speeds operated by a side lever, working over a notched quadrant. Ball bearings are used and each speed position is locked, in addition to the latch on the quadrant. The steering column has two Bowden coming through the top, with the French type of wide-angle movement for both throttle and spark control. There is also shown



a complete Aster tri-car with delivery box front. It is driven by a 4½-horsepower water-cooled motor through a two-speed gear and final chain drive. Aster motors are shown for automobiles, motor boats, and stationary and electric lighting groups. The stationary outfit is a 4-horsepower single-cylinder water-cooled motor. The electric lighting group has a 12-horsepower two-cylinder water-cooled motor. The motors shown are 14, 20, 22 and 30-35 horsepower. The 20-horsepower is made up of cylinders cast in pairs and each of the others has four single cylinders with the waterjackets flattened to shorten the overall length of the motor. There is also shown the Carron system of low tension magneto ignition, in which is used a plug with a center plunger for the make-and-break. The magneto is provided with a commutator which can be rotated to regulate the time of sparking. There are also shown the Malicet and Blin single-track ball bearings, as well as everything needed for ignition, made by the Societe des Telephones.

Aurora Automatic Machinery Co.

Thor motors for this season are a little larger in bore and stroke than formerly, these measurements now being 2½ and 3¼ inches. The rating is 1½ horsepower. A few other improvements are made in the motor. The air intake in the carburetor is changed to admit of greater control, inlet valve domes in the cylinder heads are more accessible and can be removed without interfering with the valve seating, and a roller lift is used for the exhaust valves. Pneumatic tools for all grades of work and a line of pneumatic drills and reamers are now manufactured by this company.

Autocoil Co.

Four-cylinder dash coils with rubber unit construction, four-cylinder coils with wood unit construction, three, two single and six units coils of similar designs and cylindrical motor cycle coils are the present year offering in this line. In the compound vibrator all adjustments are made by a single set screw. Tremblers of the single, double and bow spring trembler are used. In the single spring trembler adjustment is by a set screw, one and one-half turns of which will allow of the spring being removed. In the double spring trembler one adjusting screw does for both springs. The bow spring trembler is used only on high-speed high-compression motors and produce a much better igniting spark than either the single or double spring tremblers.

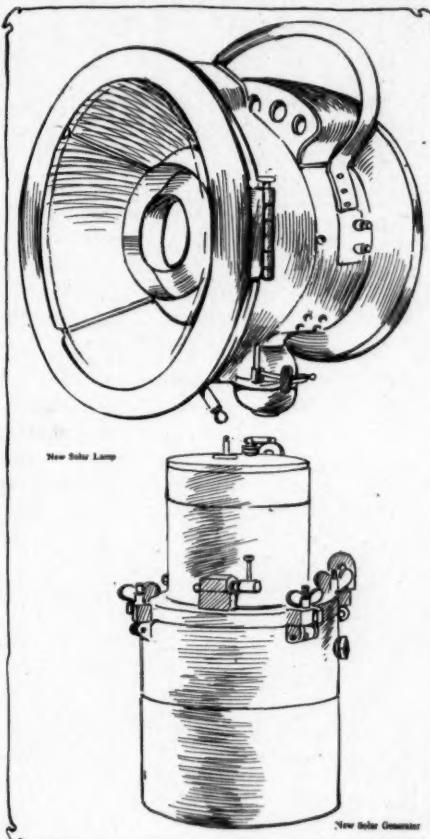
Electric Rubber Mfg. Co.

Clincher tires made from a series of layers of rubber and fabric, inner air chambers, solid rubber tires of D section and various sizes of pneumatics are made by this house. Its Panther wrapped clincher tires are made of long fiber sea

island cotton covered with para rubber, and the whole is cured by what the company terms a new slow process with live steam, which has the claimed advantage that the original resiliency of the material is not impaired.

Badger Brass Mfg. Co.

In both shows are found full lines of the well known Solar lamps, the feature of which is that the reflectors are made of white metal. In addition there is a triple gas generator which is 17 inches high and 8½ inches wide. It has a carbide capacity of 5 pounds and supplies 2 feet of gas per hour, which is ample for two headlights and one searchlight. It is made of brass. The line of lamps is most complete, consisting of solar parabolens projectors, parabolens



generator headlight, De Luxe projectors and headlights, lens mirror headlight, Solar generator headlight, Solar parabolens projector and oil side and carriage lamps.

Parish & Bingham Co.

The Parish & Bingham Co. is showing somewhat more extensive lines of cold-pressed steel frame work and complete frames than has been usual with them, at the two stands in the two shows. Although it is asserted the entire product of the company is sold until next July, for the sake of regularity both shows are supplied with exhibits. Sales Manager Blackman is showing with much pride certain drop members of a frame made for the American Mors car, now being made by the St. Louis Car Co., at St. Louis. This peculiar member is of such form that the visiting engineer of the French Mors Co.

stated it could not be made except by a hot-pressing process. The Parish & Bingham Co. not only produced the member without difficulty, but it was pronounced by the expert as better than the French counterpart. The company show complete frames and unassembled members at both exhibits. The frames are hung on exhibition racks, which are themselves splendid examples of the company's work.

Whitlock Coil Pipe Co.

This house makes exhibits at both shows, where the goods are practically the same, consisting mainly of coolers, hoods and fans. There is also a showing of the unassembled parts of the same and repair parts. The company has sold over 10,000 cellular water coolers during the last year and is selling them at the rate of 200 a week. They are used on some forty makes of automobiles.

Robinson Fur Co.

The Robinson Fur Co. makes an extensive exhibit at the armory of robes, gloves and caps. The company deals in Russian furs chiefly, though some Australian skins are used. A particularly fetching robe is made of Russian fox skins with the tails attached. The company makes a specialty of a foot muff, wadded and very comfortable for the tonneau on wintry days. It is principally a women's accessory. This is shown in raccoon and grey fox and other furs.

Gray & Davis

Gray & Davis, of Amesbury, Mass., show, as usual, a full line of lamps of all types and kinds. Their exhibits are to be seen both at the garden and the armory. One of the new lamps is a condensing lens or parabolens lamp. Gray & Davis also show a new generator of the drip type, which they have called Type C.

Werner Car Improvement Co.

With the object of furnishing an easier-riding tonneau this company has brought out a rear seat suspension in which the seat is carried on a separate framework, consisting of a pair of side pieces which, at their forward ends, are pivoted on brackets on the main frame parts near the center of the car, at a point where vibration is at a minimum. These pieces are carried above the main frame pieces throughout their length and at their rear are supported by a bellcrank pivoted to the side of the main frame pieces. One arm of the bellcrank, the horizontal one, supports the seat frame parts through a vertical adjustable support. The other arm, a vertical one, is connected through a stout coil spring carried alongside of the main frame pieces and so placed that the tension of the spring supports the ends of the seat frame parts. The scheme in short is a double spring support, one set, the regular springs, carrying the car, and the other supporting the seat and at the same time

supported itself upon the main set. The scheme can be used in limousine, landauet or other cars where a rear-carrying compartment is needed.

Thomas Prosser & Sons

Thomas Prosser & Sons, the American agents for Krupp steel, make exhibits at both shows of the well-known gun product. The steel shown is the same as that used in the making of Krupp guns. Specimens are shown which have been subjected to strains and twists and which show great tenacity and tensile strength. The growth of the trade in Krupp steel is shown to have increased greatly in the United States during the last year or so.

Midgley Mfg. Co.

Midgley sheet steel wheels, made in all sizes between 28 and 36 inches diameter, and with rims suited for any diameter of pneumatic or solid tire, are shown. To all appearances these wheels are identical with wood ones, not being any larger and having the rims, spokes and hubs identical with many of the wood artillery styles shown. In making these wheels the metal is first cut into proper sizes and then the separate parts, spokes, rims, hubs and other hub parts are formed into shape under heavy pressure. Spokes are reinforced where strain is greatest. The separate parts are brazed together, by a process in which the entire wheel is immersed in a molten bath of brass, which flows into every corner and covers every surface with a layer of metal.

Thermalite Co.

The Thermalite heating bag, at the first glance, seems an ordinary hot water bag, but it has many differences and is made to radiate its heat slowly, giving the bag merit as a winter accessory to automobiling. The bag is made in 1-quart and 2-quart sizes, the former claimed to give a uniform temperature for 3 hours and the latter for 5 hours. The bag is made of para rubber and given a satin finish. Thermalite, which is used within the bag instead of water, is odorless, is non-explosive and is a granular, heat-imparting composition. By boiling the bag a little longer and raising the temperature of the Thermalite above its melting point, the process of crystallization is suspended and it retains its heat.

Reading Standard Cycle Mfg. Co.

This concern shows three motor cycles of the 1906 type, which present many improvements over the product made last year. In addition it shows a side attachment carrying a third wheel, which can be very easily fastened to one of the standard motor cycles. This attachment can be used as a delivery wagon, with considerable space for the storage of goods, or it can be transformed into a single-seated compartment for a passenger. The engine used is the Thor Improved. The new motor cycle has a double

grip control, arranged so as to allow the sparking to be advanced before the gas is increased. The new patent spring forks have a double truss construction, and the rear forks are thrown apart to admit the use of a wheel with a 2½-inch tire. A new patent luggage carrier is attached. This can be expanded to carry a large cargo. The battery box is of triangular pattern and the cells run transversely. It is fastened behind the seat and has an expanding de-

display is a commendable one and attracts the attention of many vehicle manufacturers.

Phineas Jones & Co.

The 50-year-old firm of Phineas Jones & Co. show, as they have ever since there were automobile shows, many examples of their wheels in the white. Only the best of second growth New Jersey hickory is used, and on this careful selection of timber much of the reputation of the Jones firm has been built. An oddity shown at the garden stand is a massive spoke and section of the rim of a wheel made for the Clifton Soap Works, of Clifton, N. J., to be placed on a very heavy truck. The parts shown are very massive, the wheels being the heaviest ever constructed for a motor vehicle.

McCord & Co.

McCord & Co. have installed their sight-feed lubricators in stands at both shows. The McCord lubricator is made in from one to ten feeds with capacity varying between 4 pints and 10 pints. It is arranged to insure lubrication in proportion to the speed of the car; to give absolute delivery of oil; it has no liquid in the sight; the amount of oil can be regulated without removing covers; the force feed is small and handy. The company also makes the McKim copper asbestos gaskets, a twisted wire belt, the Hibbard automatic tire pump and carburetors, spark plugs and circulating pumps. All these products are shown.

J. M. Quinby & Co.

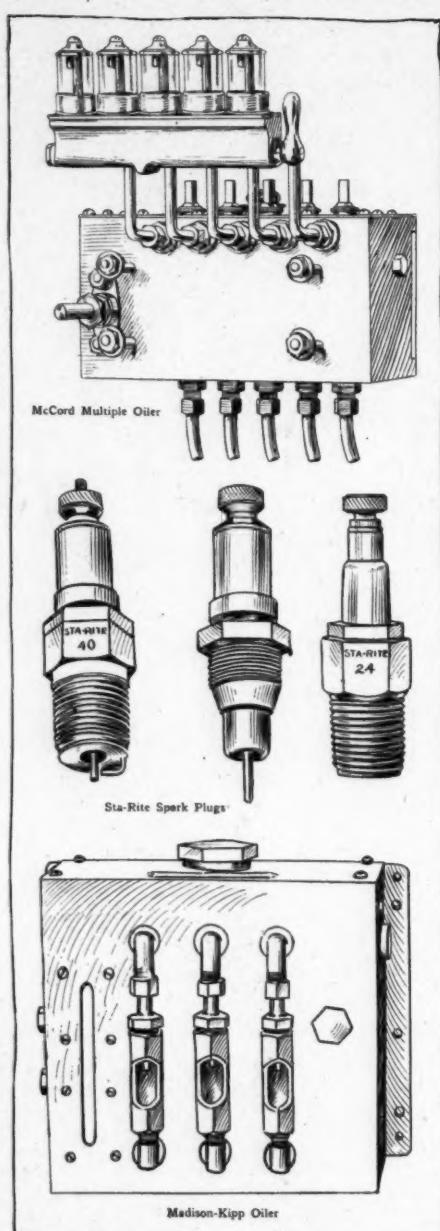
This recognized body builder has desk room in the armory annex, where the exhibit throughout the show of its bodies used by various car makers is supplemented by a large selection of card designs.

Jahney, Steinmetz & Co.

Gasoline storage tanks for underground use, with capacities from 10 to 50 gallons, are shown in this booth. Small gasoline tanks for automobile use are made in all sizes from cold-drawn seamless steel tubing. The Hill gasoline lock valve, which is for the purpose of locking the flow of gasoline from the tank to the carburetor, is shown. It is a Yale lock device attached to a regular pipe tap. The R & C gasoline indicator for telling the depth of gasoline in tanks is also shown.

A. W. Harris Oil Co.

The A. W. Harris Oil Co. has exhibits at both the armory and the garden. The company shows the following grades of oil: Excello gas engine cylinder, A. W. Harris gas engine cylinder, super gas engine cylinder, special super gas engine cylinder, super heat steam cylinder for steam cars, transmission, trans-compound non-fluid for transmission gears, motor grease, graphite grease, and Harris Scouree for polishing. The displays are



vice for keeping the cells apart. The lamp bracket is made adjustable so that any tilt can be obtained. The company is notable also as being the only exhibitor at both shows who displays bicycles. Two are shown at the armory.

Madison-Kip Mfg. Co.

The Madison-Kip Lubricator Co. shows a valveless oil pump at the armory. The pump is not an experiment as it has been made and used for years on steam engines, especially on traction engines. A sight feed for the dash is also shown. The

made in a novel manner, the oil being allowed to run from cans, over an inclined metal pan into other pans, through channels on the metal. The spectator is, therefore, able to judge the viscosity of the various grades and to get some idea of the method by which the oiling is done.

Harburg Tire Co.

The Harburg Tire Co. has on view the newest of the imported products. The tires are made in Germany, contrary to general belief, which is that they are made in Austria. The tire is claimed to be an exceedingly tough one and capable of a good deal of rough usage. One tire on exhibition has been run for 3,500 miles on a very heavy limousine machine and the mouldings are not worn off. The company will undertake the importation of these tires and to sell them in America.

Francois Richard

Francois Richard makes a showing of carburetors both for kerosene and gasoline use, which are considered sensational in their ideas. The carburetor is much smaller than any now in use and is made of brass. It is said to produce a mixture so nearly perfect that it will ultimately do away with the use of transmission gears. The firm tells with pride of the fact that the carburetor has been placed on the new 250-horsepower racer just constructed for the use of A. G. Vanderbilt at Ormond Beach. The carburetor placed on that car weighs less than 9 pounds, being constructed of aluminum. Mr. Richard is the designer of the car.

American Generator Co.

A copper tank of about 20 gallons' capacity has in its center a copper radiator coil, supplied with heat through a bypass from the motor exhaust pipe, filling the remainder of the tank is a mass of absorbent felt, which takes up by saturation all gasoline poured into the tank. Piped from the tank is a mixing device which is again connected with the motor. This mixing device takes in outside air, which then passes to the copper tank and becoming saturated with gasoline passes back by another pipe to the generator in its tiptop chamber. The feed from here to the motor is controlled by a throttle.

Mills Mfg. Co.

The Mills Mfg. Co. have a display of goggles in the armory. Full lines of all the standard types are shown and in addition a specialty in the shape of a focus-ground goggle. These goggles are made in such shape that they can be ground to provide perfect sight for those who ordinarily wear glasses. It is contended that a great number of accidents are due to poor eyesight, often on account of the fact that the user of glasses discards them when he dons his goggles. This difficulty the focus-ground goggles overcome by having lenses ground into the plain glass to

fit the eyes of the driver. He therefore sees as well in goggles as when he is not wearing them, according to the inventor.

R. E. Hardy Co.

The R. E. Hardy Co. is making forty-seven different varieties of spark plugs. The Sta-rite series of plugs is too well known to need more than passing mention. The company is making a specialty of mica plugs and is recommending certain of its types. The company also makes a

pound steam engines running in oil, developing power equal to 30 and 15 horsepower, at 250 pounds of steam, respectively. An automatic fuel regulator is also shown. All exhibits are running and the firm's stand is constantly surrounded with interested spectators.

American Ball-Bearing Co.

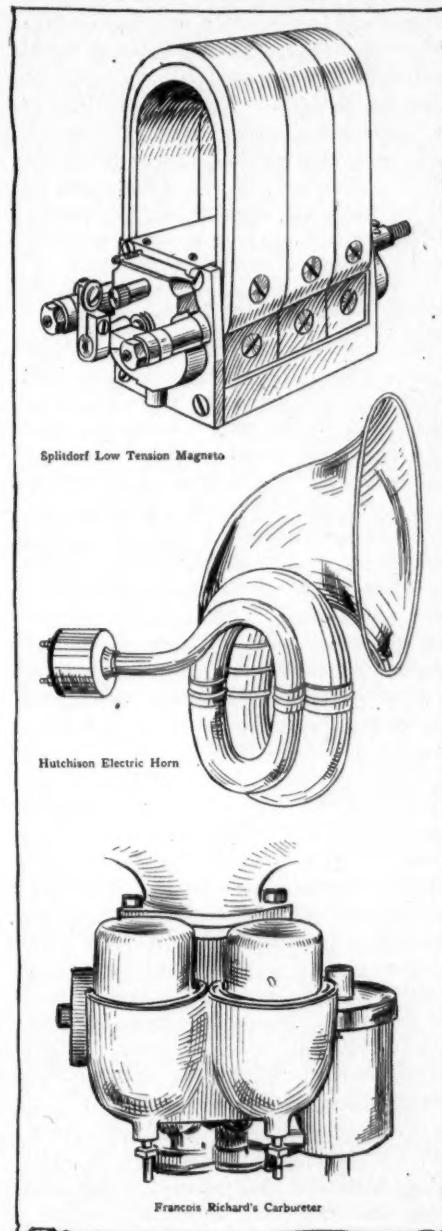
The American Ball-Bearing Co. shows front and rear axles equipped with the company's bearings. The axles are complete, with drawn sheet steel hubs and all attachments. Bearings assembled and unassembled and other sections of the work produced by the company are also shown at both exhibits. The exhibits are necessarily limited in their scope, as the company manufactures entirely on specifications for makers. It is, however, interesting to the public.

Dac Supply House

The Dac Supply House, an offshoot from the Decauville Automobile Co., and a subsidiary organization thereto, has stands at both shows. A considerable line of high-grade foreign accessories is carried by the house. The specialties shown are the Gaulois tire, the product of Bergougnan & Co., the oldest and one of the leading rubber goods houses in France. Though it has only been on the market for 2 years the Gaulois has a great following in Europe. It has been placed on A. G. Vanderbilt's new 250-horsepower racing car, which has just been completed under the superintendence of Paul Sartori. The Dac House also features a new ignition outfit, which includes a low-tension magneto and a coil and commutator, with a switch so arranged that there can be a shift from batteries to magneto while a car is going at full speed. The outfit is a very clever invention. It came from France and is called the Dac.

G. H. Curtiss Mfg. Co.

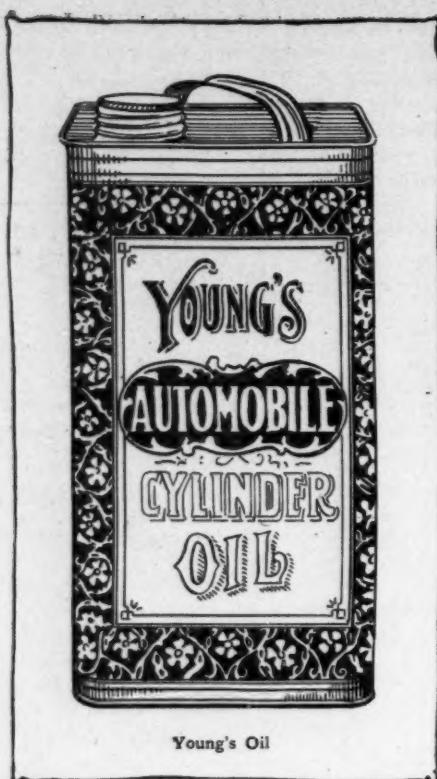
A complete Curtiss single-cylinder motor cycle and a tandem motor cycle are shown with all of their present season features. Transmission by belt remains, the belt being of V-shape and made with the top strand composed of two thicknesses of mineral-tanned leather, which is not so susceptible to stretching or breaking as the one-piece belts. The tandem motor, rated at 5 horsepower, is geared four to one. Trussed frame construction is used, the carburetor is of Curtiss make, lubrication is by sight-feed oilers, four cells of dry cells are carried for ignition purposes, 2½-inch G & J tires are used, the wheelbase is 58 inches, the frame 22 inches high and a fuel capacity of 200 miles furnished. The single cylinder cycle has among its many parts, 22-inch frame, 2¼-inch G & J tires, float-feed carburetor with compensating air valve, 58-inch wheelbase, geared six to one or four to one for racing, has sight-feed lubricators and spring forks. The Curtiss flexible



small display of coils at its garden exhibit and a more extensive display of coils at the exhibit in the armory.

F. W. Ofeldt & Co.

F. W. Ofeldt & Co. have a very interesting working exhibit of the burners and engines which they manufacture, in the basement of the armory. A kerosene burner is shown in operation and also a water-tube boiler made by the firm. An automatic water regulator is also exhibited and two engines. These are com-



Young's Oil

side car can be used for carrying an additional passenger or, if desired, a carrying compartment can be installed. The extra frame work needed for the third wheel is stoutly made.

Electric Storage Battery Co.

On a table are three types of the Exide sparking battery. The elements in this battery are of standard Exide make, and the terminals are improved somewhat. Greater care in the matter of assembling is noted and the battery is now well designed for automobile ignition uses. They are made in cases with from one to four cells in a case and with an ampere hour capacity running from 34 to 85. The weight ranges from 8 to 63 pounds and the charging rates in amperes vary in different styles from 4 to 10.

Manufacturers' Can Co.

The Manufacturers' Can Co. show at the armory a large assortment of cans for the use of oil dealers for the shipment of oil and service cans for garages and supply houses. The latter are neatly labeled and painted and make a creditable addition to the equipment of any supply station.

Veedee Vibrator Co.

This is a mechanical exerciser for those motorists who ride in tonneau or cars equipped with shock absorbers and thereby lose that old-time jar.

Hutchison Electric Horn Co.

The Hutchison Electric Horn Co. is exploiting a new electric horn which is an attachment which can be screwed onto any standard horn. The vibrations are induced by a small ignition battery near

the dash and the connection with electric buttons can be made anywhere about the car. This gives the opportunity for anyone, either in the driver's seat or in a tonneau, to give a signal if he or she is nervous or thinks the driver has not noted the danger approaching.

Safety Elevator Co.

This electric elevator machine is bolted or otherwise attached direct to the platform on which the objects to be raised are placed. It consists of a horizontal drum revolved by an electric motor. On the periphery of the drum is seated a spiral track which travels and engages with two series of rollers set on the inner sides of the guide posts, between which the elevator rises and which guides it in its ascent or descent. When the motor is started the drum revolves and travels up or down as a nut and up or down as a bolt when it is turned to the right or left.

Detroit Motor Car Supply Co.

The Wishbone folding automobile tops in this stand are shown complete with side, front and rear storm curtains. Coverings used are selected from a supply of 32-ounce rubber duck, imitation or Chase leather, three-ply mackintosh or khaki canvas. In the side curtains, made from the same materials as the tops, are fitted the large side lights. They have double lap edges with glove fasteners. The storm front is in three sections, the center one with a 20 by 30-inch window. Bows are of curved wood, finished in natural colors or reinforced with polished brass slat irons. Joints are made of drop forgings, plated or in the black.

Boehm & Levine

M. Bijou, the sole exhibit at this booth, is an original creation in the line of automobile head gear for women motorists. What apparently is a plain scarf is almost instantly transformed into a hood with veil attached by pulling a pair of strings which tie under the chin to fasten the veil in place. Pulling two buttons once again transforms it into a plain straight scarf as before. When desirable the veil part can be tucked under the hood.

Kirkham Motor Co.

The Kirkham four-cylinder automobile motor for this year is made along accepted four-cylinder lines with each cylinder a separate casting and with the mechanical inlet and exhaust valves located in the bottom of ports on the left side of the cylinders. Aluminum is regularly used in the crankcase. A combination exhaust piping is used, which is one piece and has piping for the inlet and exhaust valves, so that the pipes from the carburetor do not attach direct to the cylinder ports, but to the exhaust piping. All gears for the camshaft are enclosed in aluminum housings at the front of the case, the commutator is carried on the top

of a vertical shaft at the rear and is driven from within the crankcase by bevel gears, and the valves are removable through capped openings in the port heads. A type of cone clutch and sliding gear transmission is coupled with the motor exhibited. Standard water cooling facilities are provided, with water pump to aid the circulation. Spark plugs are carried vertically in the caps over the valve ports.

Wagner*Motorcycle Co.

In both of the Wagner motor cycles control of the motor speed is by a grip control at the right end of the handle bar. The single cylinder motors are carried obliquely close in the rear of the front wheel on a scroll tubing used for the purpose. Drive from the motor to the back axle is by a heavy flat belt. Double forks are used on the single model and also on the one with the tandem attachment. Standard Wagner colors rule throughout and other points, like large tires, heavy frame tubing, good carburetor, ample gasoline capacity and good battery supply are included in the make-up of the machine.

Randall-Felchney Co.

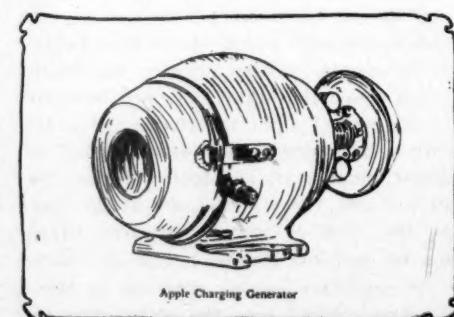
The Randall-Felchney Co., of Boston, is a well-known manufacturer of tools and machinists' supplies. It has now entered the automobile field with an oil gun which it is introducing to the automobile trade. An exhibit of the oil gun and other oiling accessories is made at the stand of the company at the armory.

Sherwin-Williams Co.

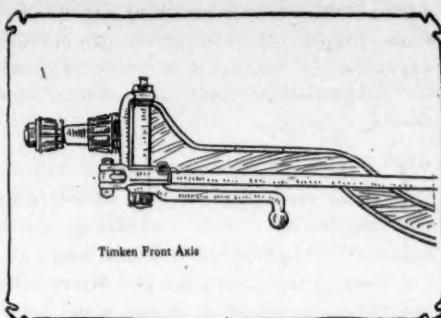
The Sherwin-Williams Co., the well-known paint manufacturing concern, is at the armory with an exhibit of body paints and varnishes. There are several metal and wood forms showing the effects produced by the company's products. The showing is cleverly contrived and makes the character of the product clear.

Survey Map Co.

Official maps for the A. A. A. are published by this exhibitor and one wall of the exhibit space is covered by an immense composite map. The maps are made in sections, such as Catskill-Albany region, coast of Maine, Adirondack region, Thousand Island division, and scores of others. Each map is large and shows all leading roadways in one color and less



Apple Charging Generator



Timken Front Axle

important roads in black. Tables of distances and nature of roads are included. The maps of a state or county are prepared in book form.

Gilbert Mfg. Co.

A line of supplies made from fabric is offered by this concern, including tire cases, of duck; storm aprons, in rubber cloth; slip covers, in rubber cloth and twill; covers for all types of lamps, in rubber cloth; rawhide tire bands; inner tube cases and knuckle boots, in duck and enameled leather; sleeve protectors, for working around the car; tool rolls in leather, and duck and puttees in black or tan leather.

Minimex Co.

The Minimex Co. shows a line of fire extinguishers for garage use. The Minimex is a cone, at the small end of which is the nozzle and at the large end a cap containing a force valve which requires a quick blow to start the chemical action which ejects the anti-flame mixture. The Minimex is used on the New York ferry-boats since the disaster of last summer. It is also used extensively in New York garages.

Wells-Light Mfg. Co.

The features of this non-skidding and retreading cover are the clasp for attaching and the shape of the metal studs on the tread. The clasp is made up of two parts—a double-ended flat hook, which hooks into the rim-edge bead, and a flat metal eyelet that is attached on each edge of the band at short intervals. The metal studs are diamond-shaped, in three rows, interfitting and with arrowhead projections on their outer faces.

Smith Mfg. Co.

The R. H. Smith Mfg. Co., of Springfield, Mass., shows a dashboard speedometer. The speedometer is displayed at work, attached to a wheel driven by an electric motor. It possesses many of the good points of other speedometers and several which are distinctly its own. The figures are very large and clear, which is an advantage not to be despised.

American Motor Co.

With the addition of the Metz designs this company now has a line of three devices in motor bicycles. The Marsh ma-

chine is retained along the lines well known for the past 3 years, with a few changes, and these in such details as growing experiences in selling dictate. The weight has been reduced to 135 pounds for road equipment, reduceable to 110 pounds for racing and the power increased over last year by 15 per cent. The Metz-Marsh machines are offered in single and double-cylinder models. The well-known features of the Metz machine are retained, including a motor of its own make and design and the direct chain drive. The position of the single cylinder is of the well-known foreign type motor, vertical and set fairly low forward of the seat post frame tube. In the double cylinder the added cylinder takes the angle of the lower frame tube, to which the motor is attached at its cylinder head, and the second cylinder retains the same position as in the single cylinder model.

B. Morgan

B. Morgan shows single-piece inlet valves at the armory. The valves have met with considerable favor among manufacturers and are now to be seen on the Locomobile and other leading makes of American cars. The arrangement looks clever. Mr. Morgan also shows carburetors and a patent hose coupling which he has brought out.

Detroit Tool Co.

Here is a distinct novelty, good for use anywhere. It is a combined forge with rotary pump, a 4 by 8-inch anvil, a vise with 4-inch jaws opening up to 10 inches, a pipe vise, emery wheel with geared power and drill press. All gears are covered and have a clutch for throwing in and out. Accompanying the tool proper are vise clamps, an anvil, crucible holder, twist drills and tongs. The list suggests a formidable and somewhat freaky affair, but such is not the case. The general appearance is that of a large tool carriage as used in automatic lathes, with a pan extension which is part of the forge outfit.

Connecticut Telephone & Electric Co.

The Connecticut Telephone & Electric Co., of Meriden, Conn., makes a large display of ammeters, coils and batteries. The storage battery showing is a very fine one. The company is a new comer in the field of automobiledom, but has made enormous strides during the past year.

Le Nonpareil Muffler Co.

This muffler is really an expansion chamber with about five times the cubical contents of one of the cylinders. This chamber has a valve at its back end, toward the atmosphere, which is opened and closed in turn with the engine, closing when the exhaust port of each cylinder opens. Immediately thereafter the muffler valve opens, and is fully open when the piston is traveling fastest expelling the

burnt gases from the cylinder freely and unobstructedly through the muffler expansion chamber.

Gleason-Peters Air Pump Co.

Air pumps for filling automobile tires, air supply tanks in garages or repair shops, or tanks for other purposes, are being made by this leading concern. These pumps, as previously, are designed for any kind of power, such as belt, chain, hand, etc. Reservoirs, mostly of the cylindrical style, are regularly fitted with pressure gauges on top and exit tubes with hand stop cocks.

Orlando W. Young

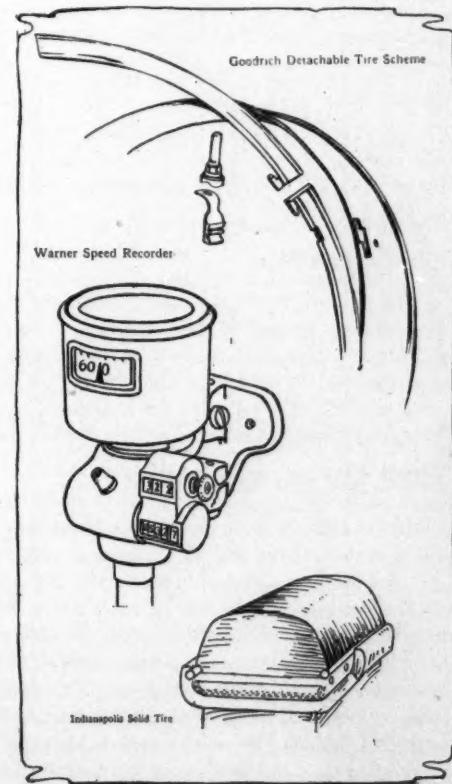
Orlando W. Young shows oils and greases, polish, cements, patches, auto soap for body paint and specialties at the garden. The Young display includes a non-fluid oil which was tested and experimented with for a year after the discovery of the compound before it was put on the market.

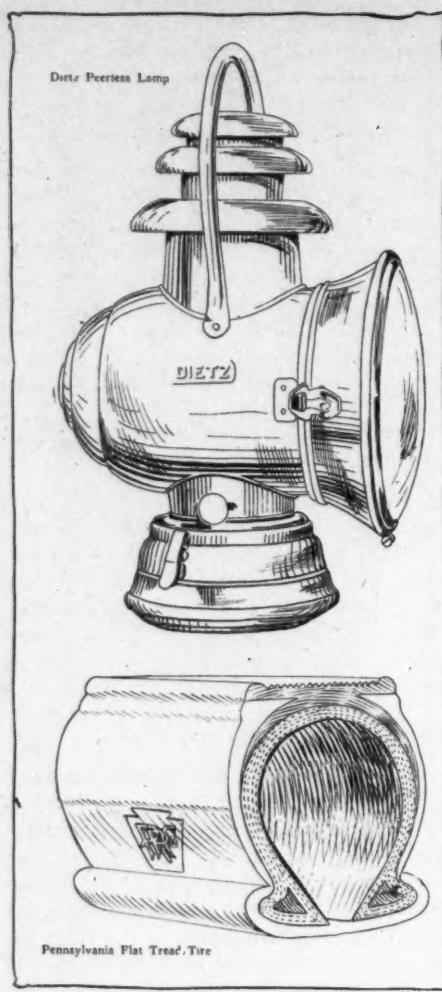
C. F. Splitdorf & Co.

C. F. Splitdorf & Co. make their usual showing of coils. A new coil which is being shown has a ratchet adjustment which adds greatly to its effectiveness. The Splitdorf high-tension magnetos are also largely in evidence. A new switch which the firm is bringing to the front has a Yale lock. The display is an attractive one to the motorists.

Louis Dusenbury

A full line of upholstery goods and all clothes and leathers is shown, together with automobile robes under the trade name of





Dietz Peerless Lamp

Pennsylvania Flat Tread Tire

Clincher tires are filled on the wheels, being first tested to ascertain whether they will stand the desired pressure.

Solarine Co.

The exhibit is of the very reliable polish which it has been making for the last 2 years and which has proved its value to all users of automobiles for the keeping of the metal parts ship-shape.

R. E. Dietz Co.

The R. E. Dietz Co. makes exhibits at both shows of the standard lamps for which the company has established a name. No very startling novelties are shown, but the displays are interesting for their completeness and taste. One of the specialties now being exploited is a lamp with a lateral side window, rectangular in form. This enables the driver to be sure the light is lit and also gives what is called a carriage effect to the light, which, it seems, is a desirable thing to have.

Bethlehem Steel Co.

I-section axles, drop forged steering knuckles, front and rear frame braces, crankshafts for single, double or four-cylinder motors and a score of other automobile castings are made by this house. Many of these are shown in the rough as they were forged. One or two are twisted in fantastic shapes to show the tensile strength and elasticity of this metal.

Midvale Steel Co.

A complete line of drop forged castings for automobiles is shown. All of these are in the rough, but many are shown finished. In finishing its gears this company takes the cut gear in the rough and after machining it to pitch, hardens it. All other blank castings are similarly machined and case hardened. Gears with an elastic limit of 115,000 pounds to the square inch are featured. Crankshafts with a similar strength are shown. Not the least interesting part of the exhibit is several crankshafts that are twisted into a circle without breaking. A front axle or two are shown also twisted this way.

National Battery Co.

The National Battery Co. has a stand in the garden where it is showing a full line of its popular batteries. The display is comprehensive and the product is so well constructed it needs little eulogy.

Auto Brass & Aluminum Co.

From Flint, Mich., comes to the garden show a considerable line of brass and aluminum castings and parts. The product is well finished and shows care in the making. The company reports a continuance of its large business.

Patterson, Gottfried & Hunter

A well-filled show case and an equally well-decorated wall space show what this

concern carries in the way of all kinds of tools, copper oil cans, screw drivers and hammers. A specialty is made of gears for transmission cases and motor cam-shafts.

Auto Supply Co.

Perhaps the thing of this exhibit is an annunciator which is an oblong glass-covered box carried on the dash and on it are a set of directions for the driver with such words as go, stop, faster, slow, home, etc. In the rear part of the car is a corresponding keyboard and by pressing the keys lightly a light is lighted over the required direction and should this fail to attract the driver a little harder pressure rings a bell.

Hicks Speed Indicator Co.

Hicks' speed indicator and odometer is a rectangular-shaped instrument, in a dust and waterproof case, that is offset at the dash at the proper angle to be easily read. The regular instrument records speed up to 50 miles per hour in steps of 5 miles with the odd fives above the scoring and the even multiple of fives below. The trip recorder, registering in tenth miles up to 100, is above the speed marks and the total recorder, registering up to 100,000, in tenths, is below. The construction is very simple, only three gear wheels being used. Provision is made to lubricate all bearings through an oil cap placed on top of the indicator, which feeds oil through small tubes to all the bearings. Drive is through a flexible shaft running through the floor of the car, thus avoiding sharp bends in the shaft with consequent breakage. The universal brackets, which connect the flexible shaft to the gear on the hub of the front wheel, can be attached to any car. An odometer with trip and total figures is also made with a spherical dial as also the combined instrument for recording over 50 miles to the hour.

Teel Mfg. Co.

Making a long list of specialties from cape tops to solid brass monograms, the one that just appeals to the eye is the Teel rolling front. This mud and rain shield uses celluloid instead of glass. When not in use the front rolls down to top of the dash and the standards fold together in a position on top the roll. The general advantages pointed out by the attendants are that it is lighter than glass, easier to handle and will not steam up in cold weather.

Auto-Lock-Plug Co.

While the Auto-Lock can be made to apply to any detailed part of the most intricate machinery, its value to the automobile lies in its application to such parts of a car as the electric switch plug, the bonnet, the gasoline or air feed to the carburetor, etc., thus keeping the hands of the mischievous or vicious from tamper-

Ideal. There are tasty suits for chauffeurs, tonier rigs for the owners and my lady finds plenty to admire in the way of fine furs. The robes displayed are particularly handsome and make one almost wish winter were really here.

Roth Jack & Tool Co.

The Roth Jack & Tool Co. shows a very strong foot jack for automobiles. It is strongly built and has a tremendous lifting power. The jack can also be operated by a lever by hand. The exhibit is made at the garden.

Adam Cook's Sons

The Albany concern makes a display of its Albany grease at the garden. The product is too well known to require a description. It is still packed in the large cans which have come to be a feature of every well-appointed garage.

Ever-Lastic Tire Works

Ever-lastic is a composition resembling quite soft rubber, and is used as a filling to take the place of air in the tire. While in a fluid state it is forced into the tire under air pressure till the tire is completely filled and the gauge stands at the desired pressure, anywhere from 30 to 150 pounds. After 48 hours it becomes a seasoned mass, but with a certain elasticity not to rob the tire of its resiliency.

ing with the car or attempting to drive it away. The operation is through a small handle controlled by a Yale or a combination lock.

Havemeyer Oil Co.

Oils for the motor, oils for the gear box, oils for the cylinders, oils for high and low compression motors, in short, oils for every part of the automobile are made and shown by this concern. Samples of the many varieties are on view, the entire exhibit being symmetrically arranged. Attention is called to high flash point and fire test oils.

C. Billy

One of the best known French lamps is shown in its complete line has this booth, for which Smith & Mabley are the sole American agents. The lamps include not only the outside gas and oil lamps, but also a line with burners for gasoline and electric interior for special cars. In addition is shown the Billy annunciator set with its multiple keys electrically signaling the driver the wishes of the rear occupants,

Pantosote Co.

A full line of Pantosote cloths which is a substitute for leather in the upholstering of cars and in the making of tops, side and rear curtains, is shown. Pantosote in all colors of the rainbow and with imitations of every grade of fancy leather are shown. This product has claimed for it a waterproof nature, good wearing qualities and an appearance that not only retains its original gloss and shade, but endures the weather well.

Veeder Mfg. Co.

The Veeder company shows odometers in great profusion at both buildings, the cases containing the examples being labelled carefully, the labels showing the various types and models of machine for which a particular odometer was made. There is also a working exhibit contain-

ing wheels set on fixed axles and having odometers attached. The visitor may whirl the wheels and find out what he can of the manner in which the machine registers. Each exhibit is complete. The Veeder products show little change from what they were last year but are more comprehensive in their scope and more simple in their workings.

Vacuum Oil Co.

The Vacuum Oil Co. shows its well-known Mobiloil in a number of different grades and packed in a number of quantities. The known character of the oil, in addition to the very attractive manner in which it is packed, have made the oil very popular with automobilists. Many of the best known race drivers use it exclusively.

Scandinavian Fur & Leather Co.

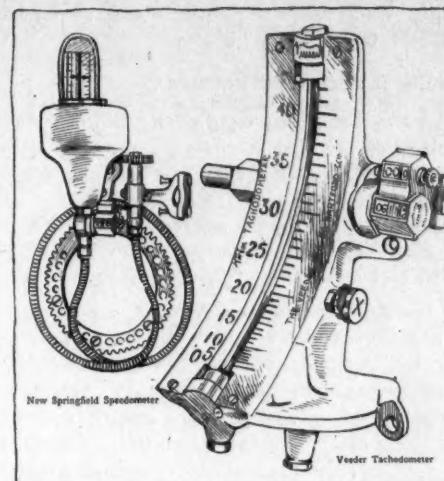
The Scandinavian Fur & Leather Co. exploits its fine line of fur and leather goods in a room at the armory which is given over entirely to the extensive display. The goods shown include robes, cloaks, muffs, foot-muffs, gloves, caps, boots, etc., all in furs in a half a hundred kinds. Also silk and cloth outfits for women and men and leather suits, coats, blankets, cloaks and caps in great profusion. There is also a showing of goggles and veils and head-wear for women, as well as several specialties which the company is developing.

R. H. Smith Mfg. Co.

A new speedometer, the Springfield, is shown, the feature of which is the steadiness of the pointer, it being claimed no jolt can divert it from its true position. Owing to the fact that the dial is made from a luminous material, enough light is emitted in the dark to show the position of the pointer. There is a safety device on the universal pinion-attaching bracket, which is adjustable so that it fits any steering knuckle. If the pinion is thrown out of mesh with the gear it automatically returns to the correct pitch line as soon as the gear clears itself. It is connected to the wheel through a jacketed flexible shaft. All bearings are self-lubricated. The device is shown in four styles—a 50-mile combination speedometer and odometer, a 50-mile speedometer without the odometer, an 80-mile combination speedometer and odometer and one registering the same distance without the odometer.

Greene, Tweed & Co.

The Multiplus force feed lubricator, shown by this company at the garden, is attached to the back side of the dashboard. It is made in two sizes, 6 by 5 by 5 inches, with a capacity of 2 quarts and adapted for one to four pumps or feeds, and a 12 by 5 by 5, with a capacity of 8 pints, adapted for one to eight pumps or feeds. It is operated by a rotary-motion and equipped with top sight feeds. The



tanks are made in aluminum, brass or iron. They can be instantly changed from one to four or from one to eight feeds, or vice versa, without taking the lubricator apart. Extra pumps can be quickly attached. The pump chamber is movable and operates on a hollow, stationary plunger. The sight feeds can be operated on the dash or any convenient viewpoint of the vehicle, regardless of the location of the lubricator.

Noera Mfg. Co.

The Noera Mfg. Co., of Waterbury, Conn., is exhibiting at the garden a line of hand tire pumps and some very fine oil cans and other oiling devices. The finish of the work is particularly creditable. The line is a new one,—at least to the automobile trade, but has made a favorable impression on all who have seen it at the show.

American Generator Co.

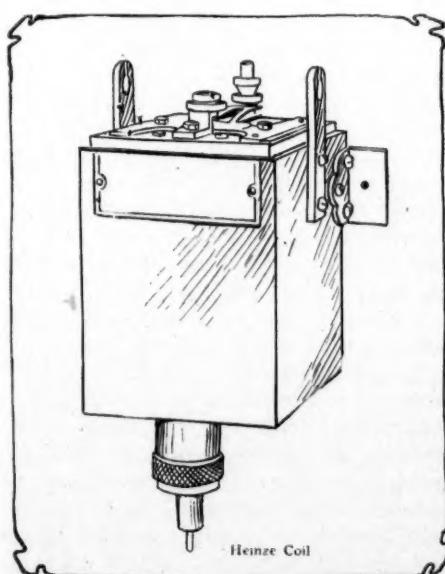
One of its generators is in operation in connection with a Buffalo engine at the armory show. The demonstration shows the device to be a very effective one. It has not been long on the market but is well-liked by those who have installed it.

R. M. Hollingshead Co.

The Whiz specialties of this company embrace every class of lubricants, greases and soap. In the cylinder oils put out under this brand there has been considered the high speed of the piston as well as the changes of temperature from summer to winter.

Belden Automobile Transmission Co.

This transmission, shown at both shows, is made up of only two gears. It is combined with the bevel drive whether used on a cross-shaft or a rear shaft propeller drive. The shaft from the engine ends in a plate having two rows of concentric studs on its back face, which are thrown in or out of mesh with a straight face gear. The gears are not in mesh when running on high speed. In other words, nothing is running except the bevel gears when on high speed and no gears are run-



ning when on first, second and reverse, except the lantern pin-gears.

William Roche Dry Battery Co.

An extensive showing of its well-known batteries is made at the garden. The dry batteries made by this concern are well known in the trade. It is also showing a new coil, of which much is expected.

Gas Engine Whistle Co.

Here is shown the Watres spent gas brake and whistle, which can be attached to the exhaust and used as a means of braking the car on emergency or the exhaust can be diverted into a whistle which is used in lieu of a horn. The arrangement is very clever and presents great possibilities in the line of safety and security. The display is a working one and attracts a great deal of attention.

Klean-al Mfg. Co.

Klean-al is one of the dirty hand cleaners met with only yearly at the shows but throughout the season around the garages. Its name tells its usefulness and it is an antiseptic preparation. It is guaranteed as free from acids, alkalies or sand. In addition to cleaning hands it can be used for clothing, paint or metal.

Post Mfg. Co.

A tread band, of leather and with non-skidding surface-studs, is being shown under the trade name of the Woodworth detachable tread. The mechanical means for retaining the tread in place is by wire cables with brass tighteners. In tightening the wire ropes they wind in a groove and small hooks in them engage the rope to prevent the tighteners turning back.

English & Mersick Co.

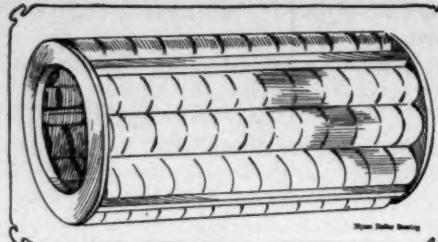
The old-time carriage goods house, while supplying for some time past the automobile manufacturers with a general line of carriage fittings, is now for the first time exhibiting at an automobile show. The goods represented in the exhibit include everything that can be used in the fitting of automobile bodies and their trim.

Schwarz Wheel Co.

The road wheels shown by this concern in the garden concert hall exhibit are of novel construction at the hub ends of the spokes. These ends have a yennon on one side and a groove on the other and when assembled in the complete number of spokes, are so interlocked that without either hub-bands or felloes, cannot be dished or pulled apart by any ordinary pressure.

Milwaukee Rubber Works

The Fawkes semi-solid rubber tire, made for attachment to clincher rims, stands first at this booth. This tire has two parts, one an inner core of soft rubber which does the same duty as the air cham-



ber in a pneumatic, and the other an outer casing with clincher lips which is vulcanized in place over it. The inner core of soft rubber is a cylindrical rubber ring with a series of openings on the top and under side of it, the top and bottom openings being alternated with each other. The Fawkes tire is also made without the clincher lips.

New York Sporting Goods Co.

Marchand French horns, Sunlyte lamps, Tritone exhaust whistles, Tompkins map covers, speedometers, dry cells, igniters, anti-shocks, igniting dynamos, and the dozen and one other automobile supplies comprise an attractive group of accessories here.

Manufacturers' Foundry Co.

Well knowing that almost every foundry which has at one time or another made a few cylinders advertises "cylinder castings specialty," this concern has published a book of photograph reproductions of a foundry design, built and equipped for the purpose of making waterjacketed cylinder castings. The photographs show scenes throughout the plant and are published as proof of the business done on the basis that photographs cannot misrepresent or exaggerate. Not only are castings made but the equipment includes every facility for pattern making and for machining cylinders to the finest accuracy, and for testing the jackets under water pressure. Quotations are made on all necessary machines or simply on the boring or testing.

W. J. Duane & Co.

Not only are there shown automobile tops, but general upper body work, including upholstery and iron and steel work. The tops shown are of the four-bow variety, each covered with waterproof material made in all standard colors. Drop curtains are shown and a specialty is found in the large celluloid windows. These tops are made standard on many makes of domestic cars.

Auto Accessories Mfg. Co.

This concern markets a lamp designated the Phare Sterling, and a full line of four-bow waterproof folding cape tops.

P. M. Hotchkiss

This manufacturer from the Sucker state has a new scheme in the anti-shock line in the way of a device in which the

return jar occasioned by a car striking a bump or depression is taken up in an oil pressure chamber. The device, as in all others of its kind, is attached to the axle or bottom half of the spring and has an arm connected with the body frame. This arm is carried on a shaft within a central casing in which is an oil reservoir. An eccentric construction permits of the oil passing freely from one side to the other of the eccentric piece when the springs go down on striking a bump, but when the rebound comes the oil, except by passing through, cannot return to the same side of the eccentric except through a small opening, so the weight of the car is carried on the oil supply within the casing.

Sibley & Pitman

These dealers and importers of automobile supplies show the Abell combination speedometer and odometer. In it speeds as high as 65 miles an hour are accurately registered. The tripometer records each trip to 100 miles and the odometer records to 10,000 miles. The instrument is generally set in an inclined position so that the circular dial on which are the different readings is at a convenient angle to the eye. Drive from the road wheel is through a flexible shaft.

Hyatt Roller Bearing Co.

The Hyatt company makes exhibits at both the garden and armory. The Hyatt people have installed steel tables, on which they have placed small but heavy trucks about 2 feet long and 1 foot wide. The wires from the trucks run over pulleys and heavy weights are attached to the wires. Three hundred and fifty pounds are placed on each truck and the weights on the wires serve to show how easily the bearings work. For the purposes of comparison, one of the trucks is fitted with Hyatt roller bearings and the other with ordinary babbitt bearings. The company also gives the same demonstration for shafts and flywheels. In addition there is a full line of bearings, both assembled and in parts. A feature is made of the new self-contained yoke for rear axle bearings, shown in all sizes.

Sampson Leather Tire Co.

Leather-covered tires with anti-skidding treads are shown in all types with Type Course as the prominent feature. Starting as a non-skidding cover for the general run of tires there has been developed the Type Course, which is not unlike the ordinary Sampson tire in appearance, yet differs in that it is a complete shoe in itself, built up as a final unit instead of an assembly of a rubber cover and a leather casing. The inner wall of the shoe is made up of fabric and rubber in the usual general form, and combined, not attached, with it is an outer leather wall, having an intermediate leather strip at the tread portion. To the outer leather wall is

finally attached a leather tread piece, containing the steel non-skidding studs.

Hydraulic Oil Storage & Distributing Co.

This Detroit house makes and exhibits the Snell system of gasoline storage for garage and repair shop purposes. In this system of storage the gasoline is never exposed to the air after it is placed in the storage tank until it is withdrawn. By a skillful straining and filtering contrivance neither water nor dregs are drawn off, both passing through separate sluice pipes to the earth. The storage tank can be placed at any desired distance from the garage and the pipes carried to any part of the building.

Lunkenheimer Co.

This general brass goods house is showing as its specialty a multiple sight feed mechanical oiler, which is in daily operation in the booth, being belt driven from an electric motor. The exhibit shows how the oil is taken from a reservoir and, passing through the sight feeds, enters a receiving reservoir, from which it is once more pumped through the oiler. The oilers are designed for dash use and have the sight feeds on top where they are in plain view at all times. The various other styles of oil cups are shown.

Cooper-Hewitt Electric Co.

The company shows at the garden a single-phase vapor converter, by means of which small storage batteries can be charged from a single-phase alternating current supply. A glass chamber containing mercury is exhausted and contains two positive electrodes, the mercury acting as a negative electrode and induction coil mounted below the mercury bulb, resembling in appearance a small transformer, which steadies the director and bridges the zero point of the electro motive force wave of the supply. A marbleized slate panel carries a direct current ammeter and direct current voltmeter and the handle of the regulator, which is an adjustable induction coil, serving to control the current strength as well as the switches. Mounted separately is an auto transformer which serves to adapt the voltage to the supply of the direct current voltage.

Voorhees Rubber Mfg. Co.

Regulation clincher tires made from alternate layers of rubber and fabric are shown mounted on rotating wheels, and styles of cushioned tires for heavy pleasure car or commercial uses are also shown.

H. & F. Mesinger & Co.

In addition to tires made for standard clincher rims, this concern is putting out a tire fitted with a special rim. In both instances the tire is constructed entirely of heavy, oil-finished, chrome-tanned leather, no rubber or fabric being used. The different layers are cemented together

with a waterproof cement. The tread is in forms of leather disks cut from heavy stock and each disk is fastened with three screws of special design which are screwed with a cement into the solid leather. When worn, the disks can be removed by the simple process of screwing on new ones. The fastening of the tire to the rim is by means of a steel band inside the casing. This band is contracted or expanded by one nut working on a toggle spanner. The steel band is covered with soft leather to act as a base for the bottom of the inner tube. The band is flat, to prevent the tube being injured if run upon long deflated. The exhibit is at the garden.

Ed Smith & Co.

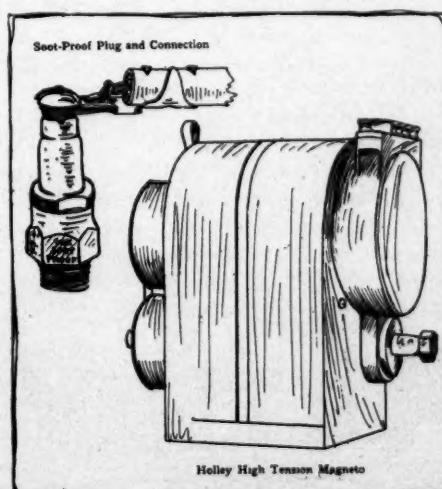
Varnishes for aluminum bodies, varnishes for pressed steel work, varnishes for wood-finished machines and varnishes for the highest grade of automobile body construction, are gracefully grouped on a long table in this concern's booth at the garden. A sample sheet of various colors finished with the different varnishes is displayed.

Valentine & Co.

The old-fashioned house of Valentine makes, as usual, a broad display of its lines of varnishes and body paints. The varnishes are practically the same as have been shown in recent years. The lines of paints show a considerable expansion and the entire arrangement of the display is such that those interested can get a very thorough idea of the remarkably extensive production of the company.

Cliff Automobile Wheel & Axle

A shock absorber built as a part of the hub is shown mounted on a display standard, in the front wheel application only. The upright spindle, turning in the axle yoke, is mated to a sliding member extending into the hub. This member has a helical spring mounted in it which takes up any sudden reaction when the wheel passes over an obstruction or into a road depression. The construction involves a



large-sized hub but does not appear particularly heavy.

Michelin Tire American Agency, Inc.

Michelin, in all of their well-known styles, are shown. As expected, attention is devoted to the larger sizes, in which the flat corrugate treads predominate. Samples of non-skid treads and various inner tubes are exhibited.

Julius King Optical Co.

A show case filled with goggles of all shapes and sizes, and other interesting face and eye protectors, is here seen. In addition to this line of optic protectors is carried dash automobile clocks and combined clock face ammeters and voltmeters.

Albert Champion

This importer of French ignition appliances and general motor car requisites shows the Nieuport coil for high tension work, and in addition has a line of magnetos, siren horns, electric horns, switches for the dash, charging boards for storage batteries, many styles of coils and a comprehensive line of spark plugs.

William M. Poz

'Rubba-silk, a silk and rubber textile combination in both wool and silk face and all-silk face, is shown in a number of automobile coats at the garden show. The material is particularly light and makes a rich looking garment. Rubba-silk has a deep nap backed by a coating of para rubber to make it waterproof.

New York Carriage Top

As in all other tops, so in this one exhibited. The covering part is in leather, duck, khaki or any other waterproof material, and the side bows are finished in any color. A full quota of side and other storm requisites are shown.

W. J. Kells Mfg. Co.

This well-known New Jersey house is showing its usual complete line of bonnets, hoods and radiators. In the latter, every type of radiator known or used is shown, giving purchasers the widest range in selection.

M. Soffen

This exhibitor represents the American agency of the Hercules non-skid tire, made in France. This tire follows Samson tire design with its reinforced, metal-studded, non-skid tread and its leather covering vulcanized over the rubber casing.

Manhattan Auto Top Co.

Folding four-bow extension tops are shown. These are standard throughout and are made with any style of bow and coverings of accepted styles. The usual drop curtains and celluloid windows are fitted to the Manhattan device.



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PROGRESS OF THE AMERICAN MAKERS

COLUMBIA has opened wide her gates; France, England, Germany, Italy and the nations of the world have entered; Father Knickerbocker has provided the halls and the American citizen has stormed the dual stronghold to gaze upon the best that America and the other nations have to give. Expectation has been excelled, anticipation outdone and the awestruck, bewildered American citizen wanders among and gloats upon the finest collection of automobiles ever congregated—and with two buildings, Madison Square garden and the Sixty-ninth regiment armory, to cover all.

America has arisen, Old Glory has been unfurled, American brain has asserted itself and the American built automobile takes second place to none exhibited. No longer do millionaire connoisseurs pass the home-made product with a chilly "not comparable with the foreign car"; no longer are the booths of the French or German cars the magnets of the exhibition. America in truth has arisen, her cars are the equal of the best foreign makes exhibited, the workmanship is second to none, the body designs are par excellence, the finish stands in the front rank and those all important parts, the motor with its parts and the gearset and its attributes, equal in workmanship, design and equipment to the best the genius of England, France, Germany and Italy has brought to us to see and to buy.

We are no longer an also ran. Thanks to enterprising makers, their inventive designers and their skilled artisans, we have possessed as an 1906 heritage motor cars by the score which exemplify in the construction engineering perfection, careful manufacture and luxurious appointments. The visitors at the show cannot walk through the long aisles without seeing America lead on every hand, seeing her motor cars filling practically every space and noting the marvelous strides made in a twelvemonths.

Two years ago 258 cars were displayed in Madison Square garden; last year the number was 348 at the combined shows, an increase of 33½ per cent, and this year the two exhibitions house 437 cars, showing a net increase of about 33

per cent over that of the past season. This remarkable increase in numbers is small when compared with the advancement made in design and construction. It is in the fineness of detail that the cars made between Boston and the Missouri excel as well as in mere numbers. The crankshaft bearings now answer as accurately to micrometer measurements as do those made in the finest equipped shops in Paris or London; the tensile strength of axles, transmission shafts, connecting rods and pinions is as carefully and accurately estimated here as abroad; our makers are as much busied as are the Germans in grinding cylinder walls, pistons and bearing surfaces; a look into our factories reveals the same careful composition of cylinder, valve and piston metals within a small percentage as is used in the best Italian cars, and our engineers are as engrossed studying the due proportion of weight and strength in every part as are the foreign experts.

But we cannot stop here—the half of the story is not told. One year ago many of our makers clinched sales by calling attention to a foreign make of magneto fitted on their machine. This season several of these same makers are proudly pointing to American-made magnetos and incidentally mention in closing a sale that this is an American-made machine. Last season nothing but French tires were adjudged capable of withstanding the tremendous strain consequent upon miles and miles of racing on hard roads, but now our tire makers can point with well merited pride to tires that went the 384 miles of the last Vanderbilt cup race without a single puncture or blow out.

At the last show a few of our leading makers called attention to castings that were made abroad; this season they comment on their home-made product. So could one continue throughout the whole gamut of automobile construction, particu-

larizing on every part of the machine from radiator to back axle and recalling how once others led and we followed, but for 1906 we are among the leaders.

American design, French design, English design, German design and Italian design are all alike—with one and all it is vertical motors, sliding gear transmissions and either shaft or chain drive. These designs were standardized a year ago—then, whence is it the progress of a year has come and how is it detected? The progress evidenced on all sides is not a one-man progress, it is not a one-house progress, nor is it a one-town or a one-state progress. It takes the form of a general advance, one in which the small maker as well as the biggest manufacturer shares alike in the laurels of the day. It is a progress in which the designer, the owner, and every workman required in the construction of the car have combined in bringing to its full bloom of promise. Not a progress consequent upon a few hours, or perchance a few days of desultory research, a few weeks of intermittent experimenting, a few weeks of road testing for faults. It is a progress that has come because every manufacturer with his force of engineers and skilled workmen have spent 12 long months in continual effort to design and then fashion the best that brain can conceive. It is a progress that has been aided by the armies of car owners whose intercessions to the makers for this change and that change have resulted in a better machine, a stronger machine and a car not created after the whims of an engineer who claims it should be this or that, but a machine built on the experience of thousands of miles of travel over all grades of roads and a machine capable of withstanding the pressure of American roads and American drivers.

The 1906 car is no utopian creation, no combination of niceties built for show but a two-and-two-make-four combination, one in which only what is needed is given, one in which simplicity ranks first and where reliability is the keystone.

Nothing evidences this stamp of reliability more than the attitude with which prospective buyers approach the many models reposing beneath the constellations of incandescent lights in the garden and armory. With one and all the old mooted question, "Will it run?" heard so often in the past, is silent. The "will it run?" is now as accepted as the first proposition in geometry. What interests the buyer now is, which is the best of the many good makes? The American citizen like the American maker has progressed, has become familiar with speed ratios, the principles of electricity and has mastered mechanical rudiments so that the well built motor car is not foreign to him; he knows its makeup, knows its capabilities, knows its needs and, knowing such, the close of the present year will record a tidal wave of approbation to the credit of the American motor car that will sweep the country.



JUMP SPARKS

After all it's the show, no matter if held in one or two buildings.



All the roads used to lead to Rome, but now New York is Rome.



The eastern debating society is now trying to discover if a coachman makes the best chauffeur. Next month: "Does the Cook Prefer to Ride in a Limousine or a Landaulet?"



Fame's easily gained. By simply driving a car into the town of Brownsville, Tex., George M. Kennedy goes down into history as having been the first man to steer an automobile into the village.



New Jersey's highway commissioner wants to make motorists pay taxes in proportion to the damage they do the roads with armored tires and blowers—a sort of make the punishment fit the crime, according to his way of thinking.



From a perusal of the program of the new play, "The Vanderbilt Cup," it is clearly evident that Barney Oldfield will not stick to play acting long. His name appears only once and that in common, every-day sort of type. Then it simply says, "Introducing Mr. Barney Oldfield's great mechanical effect." Undoubtedly the master of the Green Dragon must be

concealed among the "garage owners, other robbers, bell girls, guests, naval officers, cadets, sightseers and others." Barney's getting modest.



After the quicksand experience at Aztec, Ariz., it would seem that all Megargeel needs to round out his transcontinental ex-



perience is to scorch through Evanston without being arrested and to drive across on the bottom of the Mississippi river. Everything else has happened, apparently.



Refereeing a cup race is evidently enough to hold Willie K. awhile, for the young millionaire's name is missing from the Ormond entry list.

Talking about cinches—well, how'd you like to be Stanley?



A roof garden for chauffeurs is the latest. Soon the profession will be as crowded as are the doctors and lawyers.



Too bad some manufacturer cannot profit by all this mystery that envelops the A. G. Vanderbilt car. Just think of the advertising possibilities!



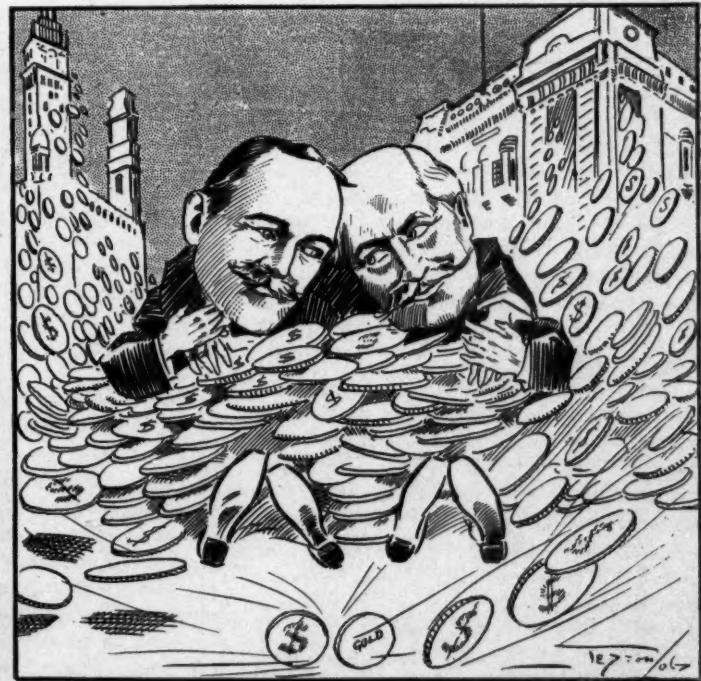
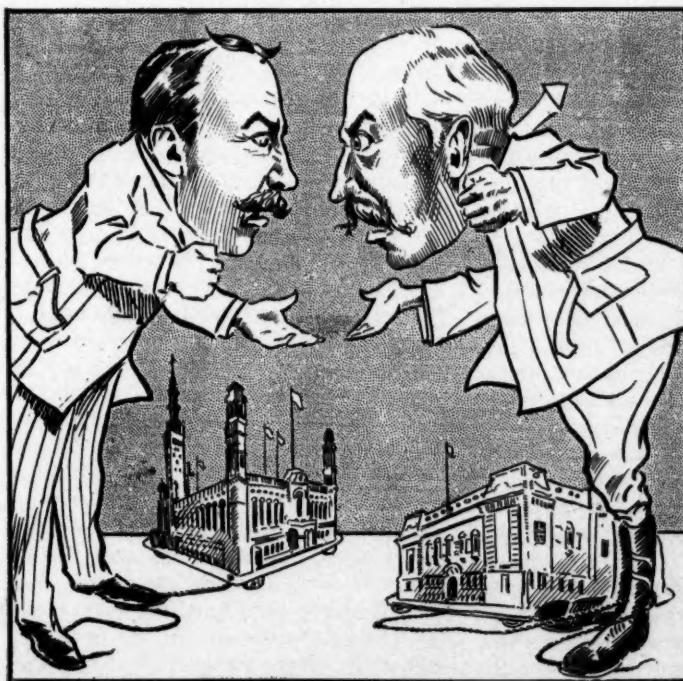
Samuel A. Miles and the Chicago show are in an eclipse this week, but the general manager of the N. A. A. M. can see a rift in the clouds along about the first week in February.



Another new garage is proposed in New York—one that will hold 1,000 cars. Promoters must be under the impression that the time is approaching when every man, woman and child in the city of garages will own a car.



That Minnesota farmer who was so brave as to loudly denounce the automobile as "the modern juggernaut" at the meeting of the Minnesota State Agricultural Society and then duck and leave someone else to read what he had written, would have made more of a hit and could have posed as a wit had he called it chuggernaut.



MANAGER DAY OF THE A. L. A. M. AND MANAGER McMULLEN OF THE A. M. C. M. A. MAY OR MAY NOT BE TAKEN FOR BITTER ENEMIES

NEW IDEA AT CHICAGO

In Order To Get Uniformity of Decorations the Show Management Will Pay for It

Chicago, Jan. 13—An innovation in the way of decorations for the Chicago show has been sprung by General Manager Miles, who announces that the entire equipment will be furnished by the management in both the Coliseum and armory. The plan of decorations, therefore, will be uniform instead of irregular lines of signs and different decorations on the stands that have prevailed at other shows. The roof and end walls of the Coliseum and the roof of the First regiment armory are to be decorated in white and gold. There will be no unsightly pillars or other projections to mar the beauty of the scene. Indeed, hardly a square foot of the walls or ceiling of either building will be visible. The walls are to be covered, upstairs and down, to a height of 10 feet, with a scheme of Dutch paneling, the woodwork being a Flemish oak, and the background of green and old gold. At the top of this there will be a cornice of staff work representing various automobile designs and bearing groups of opal incandescent globes. The decoration which covers the roof will extend under the galleries and along the walls to meet the top of this paneling.

A great deal of staff work is to be used in the signs and the pillars which support them. The latter will vary from 8 to 12 inches in diameter and will run to a height of 11 feet, there supporting the sign proper, which will be 15 inches wide, of black and gold. Suspended from this sign will be a shirred satin drapery 3 feet in depth, and in front of this, suspended by chains of old English design, will be a row of shields, each shield bearing a letter, the combination of shields forming the name of the car exhibited in that particular space. The drapery will be of old gold and the shields will be deep blue with gold trimmings. The letters will be of enamel and raised $\frac{1}{2}$ inch. At the top of the sign there will be staff work of suitable design 15 inches wide and above this again groups of three and five electrically lighted globes, 12 and 16 inches in diameter, supported by arms which will also be of staff. This work, over all, will be nearly 8 feet in width.

Not a pillar or obstruction will be visible in either of the buildings. The pillars of the Coliseum spring directly from the floor and have long been a source of worry to exhibitors. This year they will be included in the paneling and lighting scheme, as described, so that exhibitors under the Coliseum gallery will be practically enclosed in their private rooms, the front side only being open.

Extraordinary lighting effects have also been arranged for in these particular

spaces, the Chicago Edison Co. having provided a set of magnificent fixtures of extraordinary brilliancy which have never before been shown to the public.

The scene on Michigan avenue during the automobile show will, if the weather is reasonably good, be a highly interesting one. Demonstrating cars of the exhibitors of the Coliseum will, as usual, line up on Wabash avenue, and then proceed by way of Fourteenth street to Michigan avenue, and there mingle with the long line of demonstrating cars maintained by exhibitors of the First regiment armory. For a week or more the neighborhood between Congress and Thirty-fifth streets will be the scene of demonstrations of the excellent features of all the principal makes of this country and several of those of Europe. In order that full advantage may be taken of this scene the management has provided and arranged for the operation of one of the most powerful searchlights ever used in Chicago. A special structure above the roof of the Coliseum will be the scene of operation, so that the avenue may be swept for miles.

Special rates have been granted by the railroad companies, which will enable practically all out-of-town automobile people to reach the Chicago show, and return to their homes for one and one-third fare on the certificate plan. The rates, however, apply only to members of the American Motor League and of the American Automobile Association. To the former a special rate has been granted by the Western, Central and Trunk Line associations and it is confidently expected that the other associations will fall in line promptly.

READY TO RUSH TO ORMOND

New York, Jan. 16—Despite the two shows preparations for the invasion of Florida are going on rapidly and Saturday will mark the departure of the advance guard of sightseers. Others will follow the next day and when the first event is called at Ormond the trade, as well as the sporting end of the game, will be liberally represented. Lancia was at the show until today, when he packed his duds and followed his Fiat south to study the conditions.

Hemery is due to arrive on the Kaiser Wilhelm II tomorrow. The Darracq cars will be here on the Majestic tomorrow and an express car awaits their arrival to hurry them to Ormond. Deacon Holmes is expected at the show today with his Wayne middleweight racer and will leave with it for Florida Thursday.

Advices from Ormond say the vanguard of the racers has already arrived there. Speed trials are in order and miles under 40 seconds have been reeled off. Yesterday the treacherous quicksands north of Ormond entrapped several. Fletcher just escaped being engulfed. When he felt himself going down he yelled a warning to the others following. These drivers were able to push his car out before suction became complete.

EUROPE IS ALL AGOG

Renault Direct Drive Uproar Followed by Fiat Joining in War Concert With Gate System

London, Jan. 6—The absorbing topic still continues to be the Renault claim for a master patent on the direct drive gear device. The British Motor Trades Alliance—a body organized with the idea of furthering the interests of the British manufacturer in competition with every other—has gone into the matter very thoroughly, and thanks to its efforts, the full text of the judgment in the French court of appeal is now before the British trade. From this it appears that the contest between the rival firms of Renault and Corre was originally fought out on the Renault claim and some alleged French anticipation. Not until the case was taken to appeal, and a very short time before the case was heard in the appeal court did Corre become aware of the existence of the Whitney patent, which, in this country at least, is held to be a complete anticipation of the Renault device.

Strangely enough, the plea of anticipation by Whitney was rather brusquely and curtly shoved aside by the French court of appeal when it upheld the law courts decision in favor of Renault. But the judgment of the higher court made it very clear that the key to Renault's patent lies in the fact that he divided the primary shaft and secured a direct drive through by reuniting it by dog clutches in the manner which is now adopted by nine-tenths of the motor trade on this side, which gives a direct drive. It is not clear from Whitney's patent how this operation was secured, or even if it was intended, but it is quite feasible and arguable that it was intended and could only be secured in the manner in which Renault drafted it.

It is stated here that at a meeting held during the closing days of the Paris show, the majority of the French makers present agreed to accept the judgment of the French court of appeal and to take out a license and pay a royalty fee of 1 per cent on each chassis. On the other hand, a dissenting section has decided that, if attacked, it will start the battle de novo on the ground that, in lodging his specification Renault, obviously unaware of the existence of the anticipation by Whitney, failed to comply with certain technical regulations insisted on in the French patent law. His failure to do so is claimed to have invalidated his patent entirely, and even apart from that, the presence of the Whitney specification, since abandoned, is held to constitute an anticipation which, properly handled, would quash the whole Renault case. As has been said, that is the view adopted by British manufacturers, although the wish may be the

father to the thought. Some of the latter are in rather a dubious position at the moment. They are endeavoring to secure a French trade, but in face of the decision in favor of Renault and the acceptance of the patent by the French trade, it may devolve on them to not merely fight the case out in the British courts, but in the French courts also. For if they import cars with direct drives of this nature into France, they will be compelled to either accept licenses under royalty or fight the matter at law, and if they accept licenses, it is pretty certain that Renault will not be satisfied to give them a French license merely, but will insist on their taking them out to cover all their manufactures wherever sold. The British trade is fully alive to the importance of being prepared for action in the British courts, and it is fairly certain that if a writ is issued by the French firm, it will find a strong coalition of British manufacturers ready to meet it.

It is said the Renault company is supported in this patent action by M. Darraq, but whether officially or a private speculation it is not said. In any case he has bought a share in the patent for \$20,000.

The British trade, altogether, seems to be having a rather busy time in connection with patents and patent matters, as it is said that the Mercedes firm has announced its intention to proceed against all infringements of the gate systems of changing speed gears. They have chosen a very favorable moment for such a policy, if they have really decided on doing this, since quite the majority of large car makers have now adopted the gate system of changing and rejected the old Panhard system of straight through sliding gears, as it was found that the lengthy gear shafts required by the Panhard system tended towards distortion and loss of power in the gearbox.

Another Mercedes patent upon which definite action has been already taken is the adoption of the flywheels for the purpose of a fan by fitting the rim with vanes. A firm in question that, it is said, has been notified, is the Fiat. This brings a new situation in the motor trade. The Mercedes and several other firms have sold their patent rights to different firms in different countries. Thus there is the Mercedes-Du Cros, which possesses the patent rights in this country; there is the Fiat in Italy, and although the Fiat is fully enabled to use this patent in Italy, and perhaps in France, by favor of the Mercedes concern, by bringing their cars into Great Britain they are infringing the patent rights of Du Cros-Mercedes, to whom they will in consequence have to pay a royalty fee unless the conditions of sale by the parent company is covered in the same manner. With all these complications arising plenty of excitement is sure to result and possibly a long war in the courts before all these points are settled.

CAR STUCK IN SANDS

Megargel Almost Loses Reo Mountaineer While Running on Peurco River Bed

Gallup, N. M., Jan. 10—A new experience was added to the many chapters of adventures the Reo Mountaineer and its crew have been through since leaving New York city on a double transcontinental automobile tour last August. This time it was quicksand.

Ever since I was a small boy I have read of the terrible tales of quicksand that this or that person had experienced, but in those days I never dreamed that I, too, was to have a quicksand experience that would nearly cost me the little automobile that has carried Fassett and myself through so many states and territories, although I was in no danger myself.

We were informed at Holbrook that while the Peurco river was of quicksand formation, it was frozen up so solid that we could run our car right up the river bed with perfect safety. At first I hesitated to do this, for the very name quicksand has a terror for me, but after losing our way several times in a fruitless effort to follow a trail that has not been traversed since the snow came months ago, I turned the bows of the good Mountaineer toward the Peurco and turning on full speed was soon skimming merrily along over its frozen surface without a thought of danger.

Fassett had just remarked that we were probably riding over as dangerous a course as an automobile had ever taken, when there was a sudden cracking and down we went. The heavily loaded car had broken through the two or three inches of frozen sand and water, and the rear end dropped into live quicksand, followed by the front of the car. We were both thrown out by the sudden stop and, although we hit the frozen river pretty hard, neither of us broke through in landing.

A glance at the fast settling car showed only too plainly that we were in the worst fix we have yet been in since leaving New York, not excepting the 4 days' fasting in crossing the Cascades and the 3 days we were lost in the snow near Flagstaff. Throwing off our coats we started in to unload and no record-breaking crew ever unloaded an automobile filled with baggage in so short a time, yet that car settled 3 inches in the quicksand while we were unloading it. Off came hood, tanks, batteries, tonneau and flooring, but still the Reo persisted in going in deeper. Thinking that a few minutes more would see the last of our car, we hurriedly carried the end of our steel cable ashore and made it fast to a clump of bushes. Then we looked around to get our bearings.

Two miles down the tracks of the Santa Fe railroad, we saw in the fast fading twilight a section house and we made for it. With promises of liberal pay we induced the section crew of Mexicans to turn out and carrying railroad ties and such other pieces of wood as could be used to pry with, we made for the shipwrecked automobile. We worked all night, all the next day and most of the night before we were able to get the last of the now dissected automobile on terra firma. Once in the quicksands is enough for me.

When passing through Adamanta, we ran down and viewed the petrified forest, under the leadership of the famous guide, Al Stevenson, whose home for many years has been almost under the shadows of this world's wonder, and at whose hotel guests fare so well that they almost forget they are in Arizona. The marvels of this great mysterious forest of agate trees, whose presence in Arizona seems to furnish an unsolved problem of nature's pranks, defy description, so grand are they.

Of even greater interest to Fassett and myself than the wonders of the petrified woods were the mysterious carvings of the prehistoric people on the face of surrounding cliffs.

The trail after leaving Holbrook proved the most difficult we have ever followed. It is so faint that we lost it repeatedly and no wagon has attempted to follow it since the recent snow storm.

Our car, the Reo Mountaineer, is now on its 7,000th mile and seems to run about as well as the day we left New York, only, of course, our progress across the rough prairie is much slower, and low speed has to be used for safety most of the time. The 48 hours spent in the quicksands has had little or no effect upon the running qualities of the machine. Gasoline is scarce in this section and we ran entirely out at Navajo, being obliged to wire to Gallup and wait 24 hours for some to come down on the freight that only runs every other day.—PERCY F. MEGARGEL.

CUBA RECOGNIZED BY A. A. A.

New York, Jan. 16—Special telegram—W. K. Vanderbilt, Jr., presided at yesterday's meeting of the racing board, which voted to recommend to the A. A. A. board of directors that recognition be given to the International Automobile Racing Association of Cuba, which will conduct a racing carnival at Havana in February. The 1905 Vanderbilt cup race was so capably conducted that a substantial surplus resulted, which will be used by the A. A. A. in the conduct of its general work. Mr. Vanderbilt will leave for Europe within the next 10 days and in Paris will have a conference with the officers of the Automobile Club of France in reference to the Vanderbilt cup, which will soon be on its way to that country. If the French club has definitely decided not to hold a race in 1906 for its possession it is a certainty the cup will be contested for in America next fall.



MINIATURE 2-HORSEPOWER REO EXHIBITED IN NEW YORK

Scotch Reliability Test—The Scottish Automobile Club has tentatively selected the second week of June for its 1906 reliability trial.

Encourages Inventors—Through the French Academy des Sports, Baron Henri de Rothschild has offered a prize of \$200 for the best registering speedometer for motor cars.

Farmers Wrought Up—The farmers of Marion, Ind., at the session of the Farmers' Institute, passed the following resolution: "Resolved, That automobiles should be prohibited from traveling on the public roads of our state, as they have proved a menace to the life and property of the farmer and the traveling public."

Hoosier Decision—A decision was rendered at La Porte, Ind., last week in the case of Gustave Pacholke, of La Porte county, against William Brinckmann, when a jury in Judge Funk's court awarded Pacholke \$3,000 for injuries received in a runaway caused by his team becoming frightened at Brinckmann's automobile. At the time of the accident the car is said to have been going along the public highway in excess of the speed limit. Pacholke sued for \$25,500. This is the first verdict under the new law.

Motorphobic Utterances—Before the meeting of the Minnesota State Agricultural Society last week M. T. Grattan, of Preston, Minn., contributed a paper in which he styled the automobile the modern juggernaut and car owners as automaniacs. Uncle Josh and his colleagues were really indignant when they discovered how they had been abused by motorists and it is more than probable that they will appeal to the legislature to take radical action. Mayor Jones, who made the address of welcome, was caught between two fires, as it were, and had to jolly the farmers by

recommending that no mercy be shown reckless drivers who scour over the highways.

Miniature Touring Car—One of the features of the New York show is a miniature Reo touring car brought out by R. E. Olds. It is an exact reproduction of the 16-horsepower two-cycle car made by the Reo people. It weighs 243½ pounds, has a 2-horsepower motor and is easily driven by a youthful driver Mr. Olds secured.

French Tryout—Motor hackney vehicles plying for hire on Paris streets recently took part in a contest in which the prizes were awarded for running, fuel consumption and appearance and comfort of the body of the vehicle. Any involuntary stoppages were noted throughout the run, and electric vehicles, when recharging or taking on fresh batteries, were treated, so far as stopping time was concerned, as broken down. In the gasoline section the Aries won the gold medal, with the Automoto second. The Vedrine landed the electric medal, with the Electromobile second.

Pneumatic Hub Trial—The Automobile Club of Great Britain and Ireland recently completed a 4000-mile test of the Middleton pneumatic hub. The trial started November 21 and was completed December 22, proving successful despite the heavy roads. The hubs were fitted to a 16-20-horsepower four-cylinder Florentine car. The first week's run was 978 miles during which—at 900 miles—one of the pneumatic tubes had to be replaced owing to a leaky valve. The second week the car went 819½ miles, a day being lost through necessary adjustments to the car.

One hub required pumping up during this time and another was replaced. From this one there were no mishaps, the car finishing the test with a few more than 4,000 miles to its credit.

Test Postponed—The Automobile Club of Great Britain and Ireland has postponed the start of the tire trials from February 1 to February 15, entries closing January 31. At the same time will be held the speedometer and lamp trials.

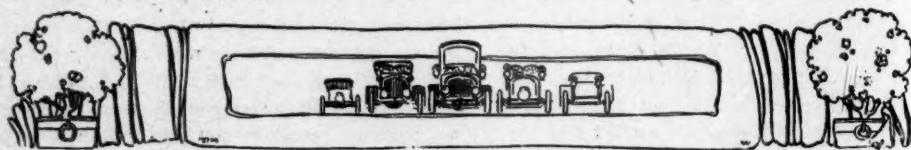
Makes Hit With Chief—Chief of the Fire Department Marjonhoff, of Charleston, S. C., has been converted to the automobile since a prominent citizen loaned him a 20-horsepower touring car while the chief's horse-driven rig was undergoing repairs.

Records Accepted—Official recognition of the following records has been made by the Automobile Club of France: Flying kilometer for runabouts—Barriaux, 1000, 32½ seconds; flying kilometer for heavy cars—F. Dufaux, Vulpes, 23 seconds; flying 5 kilometers for heavy cars—Collomb, Mors, 2 minutes $\frac{1}{2}$ second.

King's Shooting Car—King Edward knows how to take solid comfort while hunting. Recently he took in the pheasant preserves at Welbeck Abbey and drove out in a 28-horsepower Darracq from which the seats had been removed, a rotary chair placed in the center of the tonneau and a gun rack attached to the driver's seat. Without having to leave his seat the king popped away at the birds and really had a good time without exerting himself any.

Vanderbilt's Racer—Alfred G. Vanderbilt's 250-horsepower racer will be given its first speed test over the Florida sands. Those who saw it in the assembling room near Herald square say it has an eight-cylinder motor, with an engine length of 70 inches and a wheel base of 116 inches. The cylinders are cast in pairs and are copper jacketed. It apparently weighs 2,000 pounds and is to be called the Richard-Sartori, after its designer and driver. It is expected to do 152 miles an hour.

Pittsburg Doings—The annual meeting of the Pittsburg Automobile Club decided to force road supervisors throughout the state to comply with the law requiring them to put up road signs. The following nominations of officers were made: President, George E. Turner; first vice-president, W. L. Smith; second vice-president, W. M. Darley; third vice-president, C. M. Miller; secretary, Paul Wolff; treasurer, George G. Glas; board of governors, 3-year term, Edward Kneeland, E. J. Kent and C. P. Matheson. William Baum was elected to fill a vacancy on the board caused by the resignation of W. L. Elkins, turned in a short time ago.





Corbin Agencies Placed—Agencies for the Corbin have been placed with the Keystone Automobile Co., of Pittsburg, and the Genesee Motor Vehicle Co., of Rochester, N. Y.

Branch Change—The Hartford Rubber Works Co. has changed the location of its Cleveland branch, moving it from 77 Bank street to 1831 Euclid avenue. George Ostendorf, former manager, has been transferred to Buffalo, H. R. Anderson of Hartford succeeding him.

Cincinnati in Market—The board of public service of Cincinnati will advertise for bids for six automobiles of the run-about type for the street cleaning department. The cars must be able to carry two persons up an 8 per cent grade, must be electrically propelled and go 100 miles on one charge of batteries. All the horses and wagons in this department have been advertised for sale.

Monarch Trustee—L. R. Parker has been selected as trustee for the bankrupt Monarch Automobile Co., of Aurora, Ill. He gave bonds for \$40,000. His appointment is considered a victory for the side consisting of the forty-four creditors with claims amounting to \$18,000. There is talk of appealing the case to Judge Landis of the federal district court of Chicago. The case involves ninety-six creditors and nearly \$40,000 in claims.

New Winton Garage—Plans prepared by Architect Charles A. Rich for the new Winton garage and salesroom at the northeast corner of Broadway and Seventieth street, where the Winton people have secured a 69-year lease on a lot 113 by 101½ feet on Seventieth street, are for a four-story building to be constructed on the Hennobique system of armored concrete, claimed to be fireproof and indestructible. Among the novel features of the building will be a roof garden especially designed for the use of chauffeurs. At one corner of the roof garden will be a chauffeurs' club room, with library, smoking room, toilet equipment, etc., the remaining space being given over to chauffeurs for the purpose of washing up their cars, making adjustments and tuning up. Each of the four stories, as well as the roof garden and basement, will have 14,000 square feet of floor space, making a total of 84,000 square feet. The first floor will be devoted to salesroom and offices, together with reception and retiring rooms for the company's women patrons. The second and third floors, as well as the major part of the fourth floor not devoted to the repair de-

partment will provide space for the storage of 300 touring cars.

Low Gear Test—The six-cylinder Franklin driven by W. F. Winchester, is reported to have done 30 miles through the mud on low gear running between Philadelphia and New York recently.

Kentuckians Have a Line—The first automobile line in Kentucky was put in operation January 7 between Columbia, Adair county, and Campbellsville, a distance of 20 miles. Two trips a day will be made. Mail and express will be carried and the bus has a capacity for eighteen passengers.

Boldt Building—George C. Boldt, proprietor of the Waldorf-Astoria, has filed his plans for a six-story garage to be erected at Broadway and Sixty-second street, New York, to cost \$275,000. The building is to be occupied and managed by the Club Garage of America, the interested parties being Mr. Boldt and other members of the Automobile Club of America. Contracts have been let and the building is to be rushed through to completion by April 1. In it will be 81,000 square feet of floor space, with storage accommodation for nearly a thousand cars. There will also be club rooms, dressing rooms, chauffeurs' rooms and a complete machine shop. Branch garages are to be established in Boston, Philadelphia and other cities, in which the courtesies of membership will be interchangeable. On opposite corners of Broadway and Sixty-second street will be the new salesrooms

and garages for Panhard, Cadillac and Thomas people.

New Buckeye Concern—The West Side Motor Co., of Hamilton, O., has been started by John E. Schmitt, Charles E. Schmitt and Clarence Murphy with a capital of \$10,000 for the purpose of handling automobiles and also doing a garage business.

Yucatan Wakes Up—In order that Merida, the principal city of Yucatan, may display its progress when President Diaz, of Mexico, visits it next month, three carloads of Franklins are now on their way to that city, having been ordered for the occasion by an importer who believes there is a chance to start a boom in Yucatan.

Diagrams Out—A. M. Andrews, secretary of the automobile parts, appliances and accessories exhibition scheduled to be held in the First Regiment armory in Chicago, September 22 to 29, has issued diagrams for his show, which is designed to give the accessory people a chance to exhibit their wares to the public at a time when it will do them most good. He asserts that 35 per cent of his space has been taken, and that a complete list of the intending exhibitors will be given out after March 1.

To Make Trucks—The factory of the Couple Gear Freight Wheel Co., of Grand Rapids, Mich., has been completed. Machinery is now being installed and active operations are expected to begin January 22. The company will manufacture a 5-ton truck, the output being 300. The building is but the first of a series of similar ones which are to be erected as the needs of the business demand. Each building will make one size truck. These will vary from 1-ton delivery wagons to 10-ton trucks, all manufactured under the license of the Holson Motor Patents Co., of Grand Rapids. The building is of brick, the main portion being 50 by 200 feet.



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Important Notice—This reduced rate benefit is for league members only. Persons wishing to join the league and to receive this benefit should immediately send names and addresses—plainly written—with 1 year's dues—\$2 for each applicant. The railroad associations will not grant reduced rates in aid of an automobile show or any other purely commercial enterprise. They will recognize only those certificates which are held by league members.

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